WTC
DRAWING
BOOK

12

CHAP. 1-2

Bofosa

Book 12

212

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DRAWING BOOK 12 | WTCI-34-LERA | DATE 10/ 6/72

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12-JK0- 0

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

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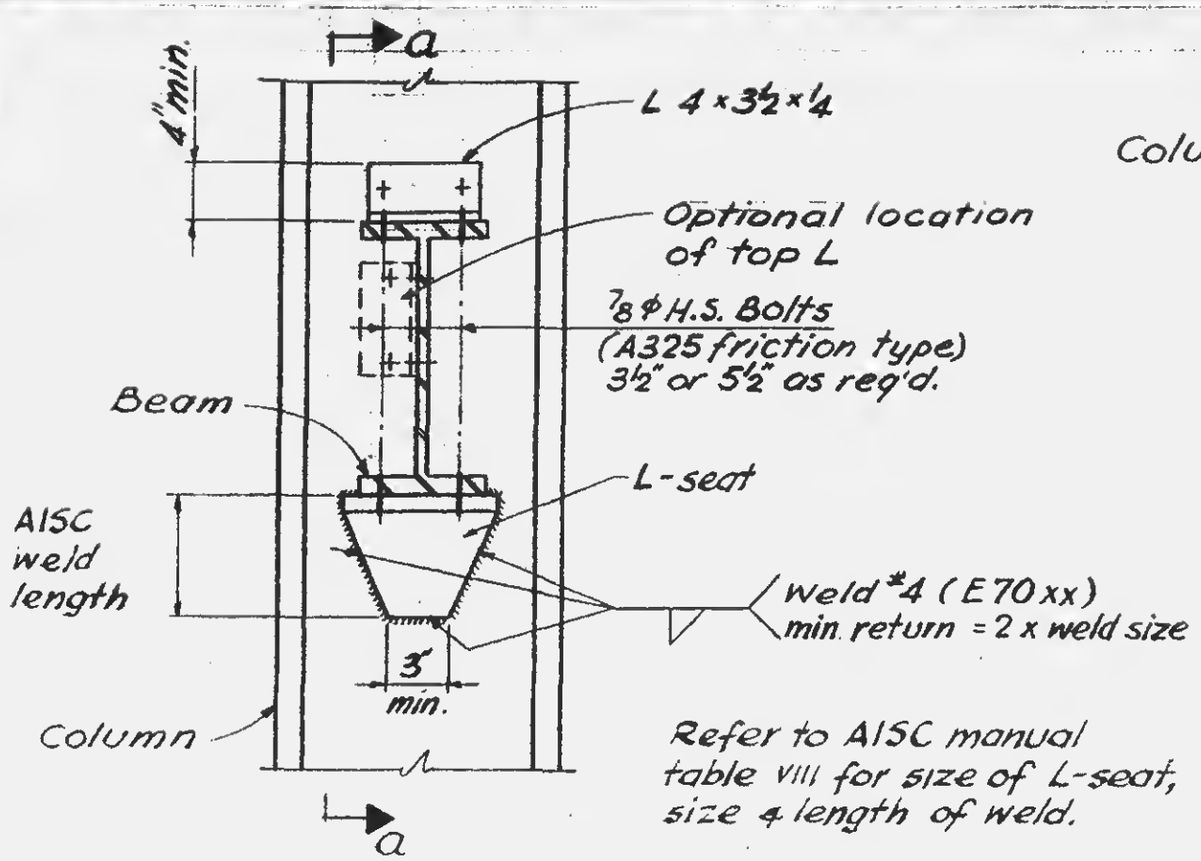
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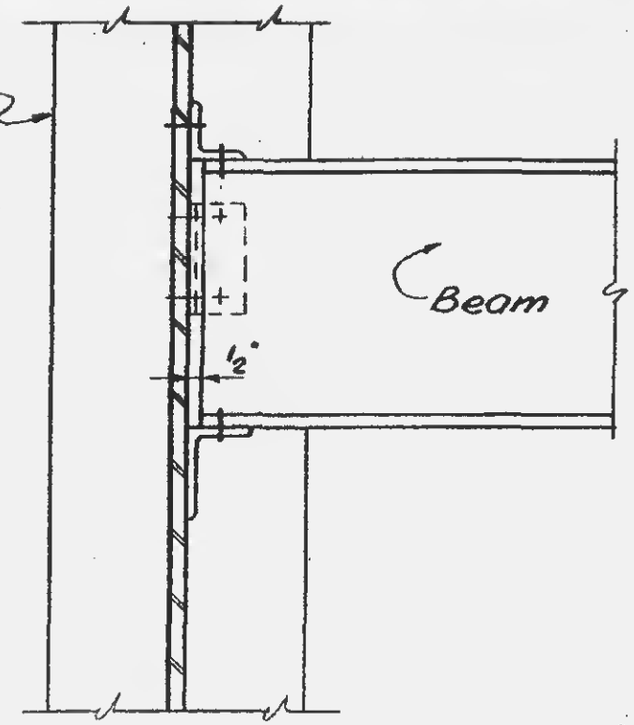
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PROJECT THE WORLD TRADE CENTER | TITLE TYPICAL BEAM TO COLUMN CONNECTION | DATE 10-29-67

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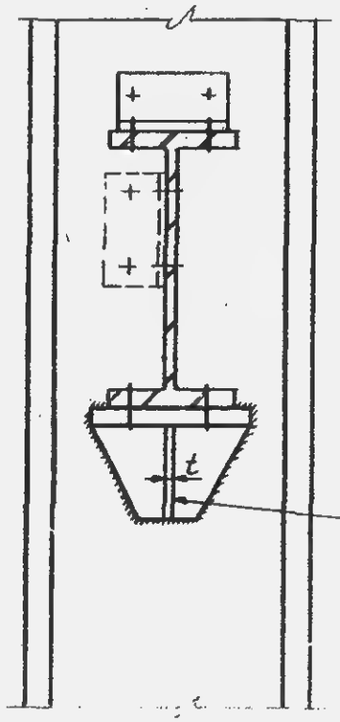


Refer to AISC manual table VIII for size of L-seat, size & length of weld.



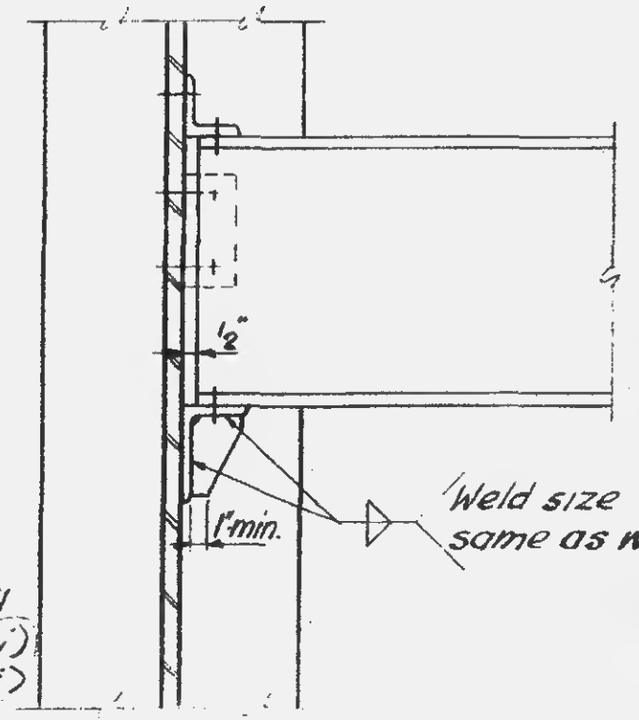
SECTION a-a

ANGLE - SEAT CONNECTION TO COLUMN - WEB



Stiffener
$t \geq$ beam web thickness (A-36)
$\geq 1.4 \times$ beam web thickness ($F_y \geq 42$ KSI ≤ 50 KSI)
$\geq 1.66 \times$ beam web thickness ($F_y = 60$ KSI)

OPTION



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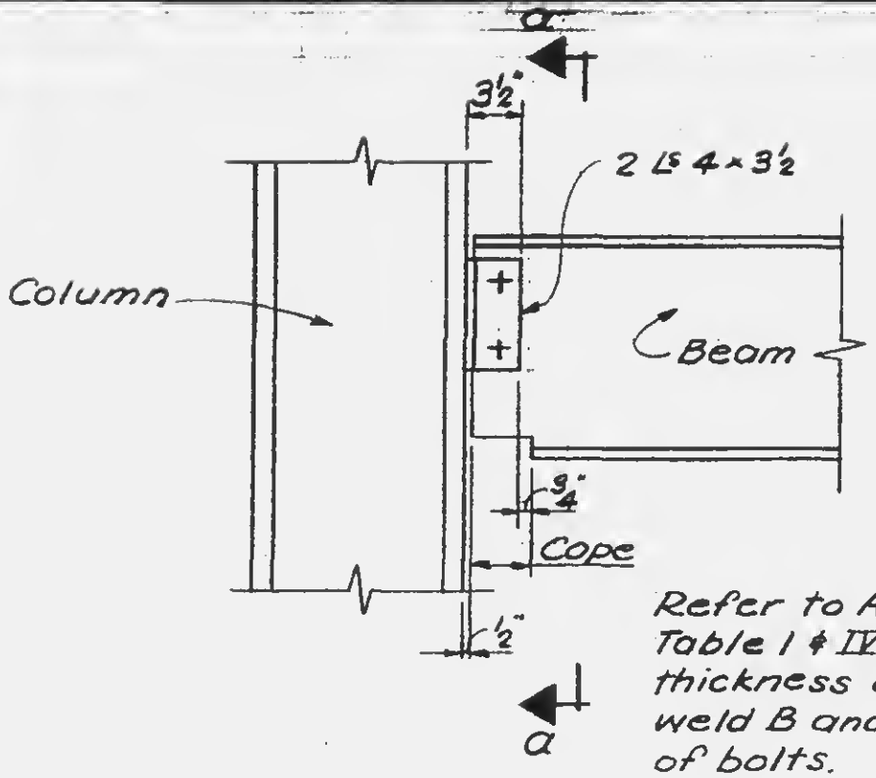
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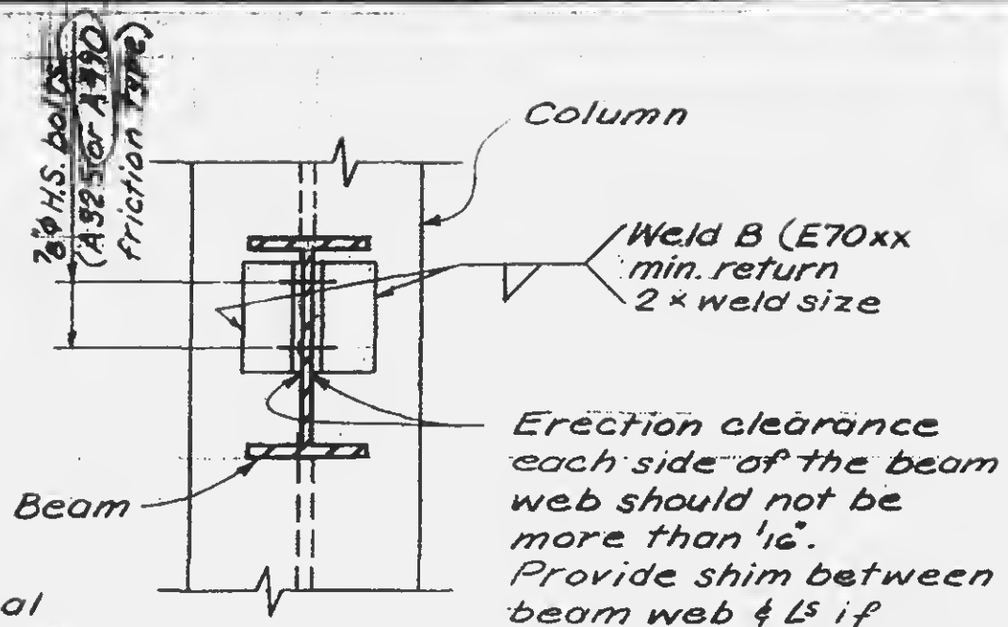
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PROJECT: TYPICAL BEAM-COLUMN CONNECTION — DATE: 10-10-67

REVISIONS
7-19-68



Refer to AISC manual Table I & IV for length & thickness of Ls, size of weld B and number of bolts.



SECTION a-a

Erection clearance each side of the beam web should not be more than 1/16". Provide shim between beam web & Ls if necessary to insure surface contact for H.S. bolts.

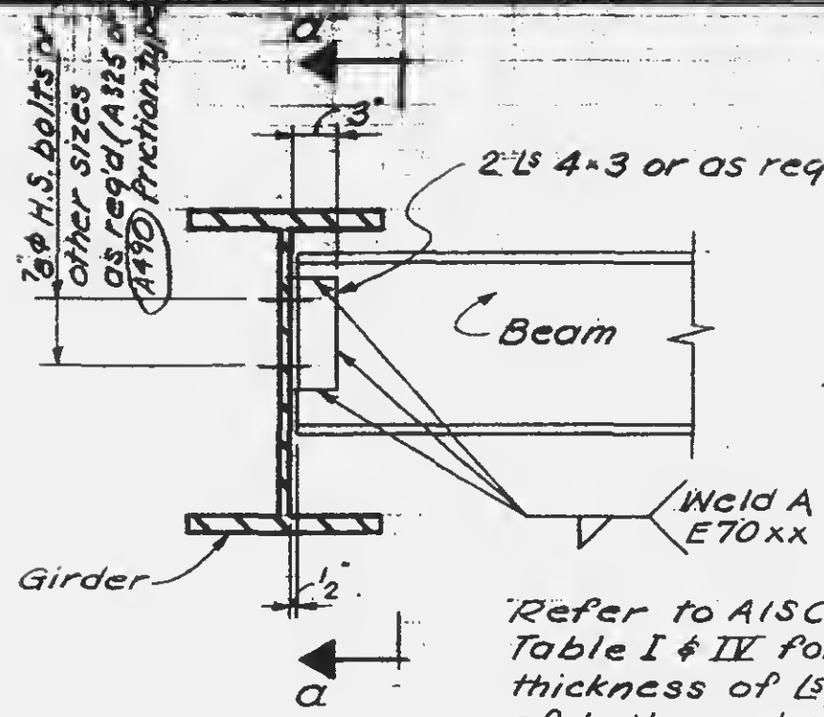
CONNECTION TO COLUMN-FLANGE

LESLIE E. ROBERTSON — No. 24360 — REGISTERED PROFESSIONAL ENGINEER — STATE OF NEW YORK

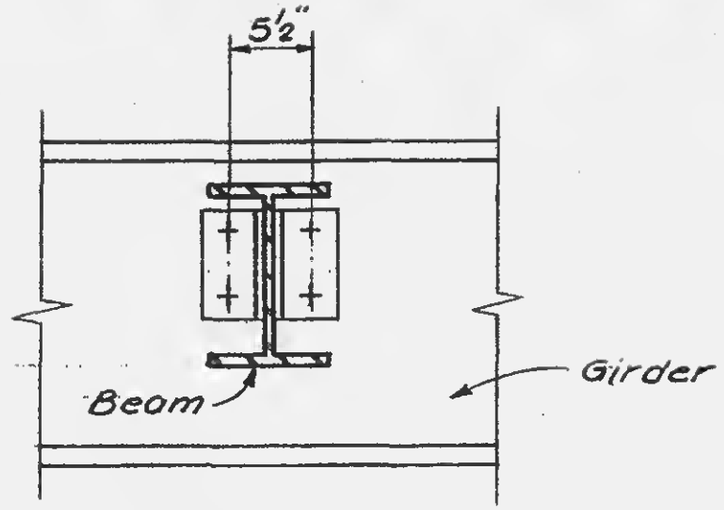
12-JK1-4

REVISIONS
2-16-68
7-19-68

PROJECT [illegible] BEAM TO GIRDER CONNECTION DATE 10-20-67

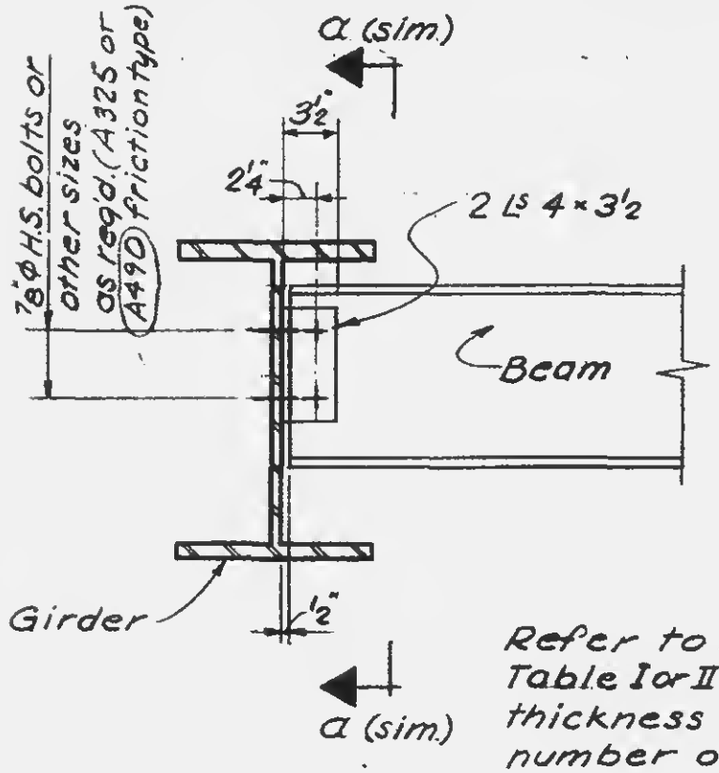


Refer to AISC manual Table I & IV for length & thickness of Ls, number of bolts and size of weld A.



SECTION a-a

WHERE TOP OF BEAM IS LOWER THAN TOP OF GIRDER



Refer to AISC manual Table I or II for length & thickness of Ls and number of bolts.

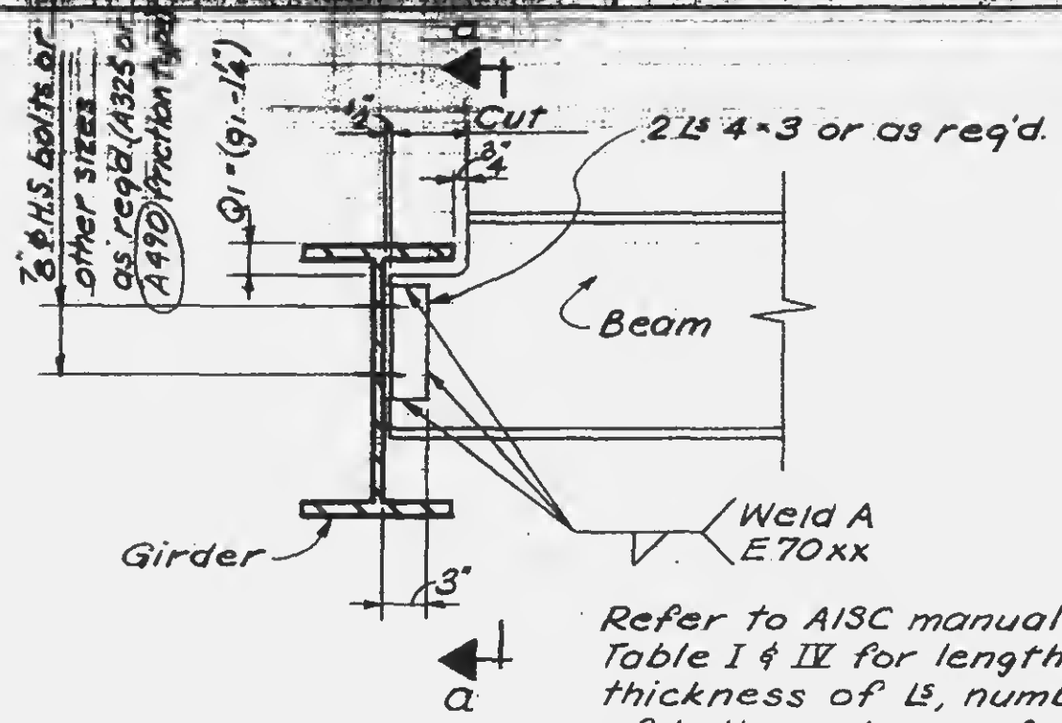
OPTION

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LESLIE E. ROBERTSON
No. 34360
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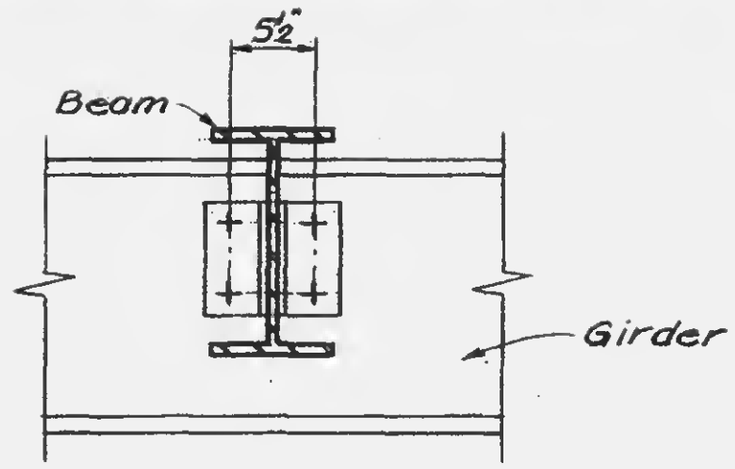
12-JK1-30

REVISIONS
2-16-68
7-19-68

PROJECT: TYPICAL BEAM TO GIRDER CONNECTION — DATE: 10-20-67

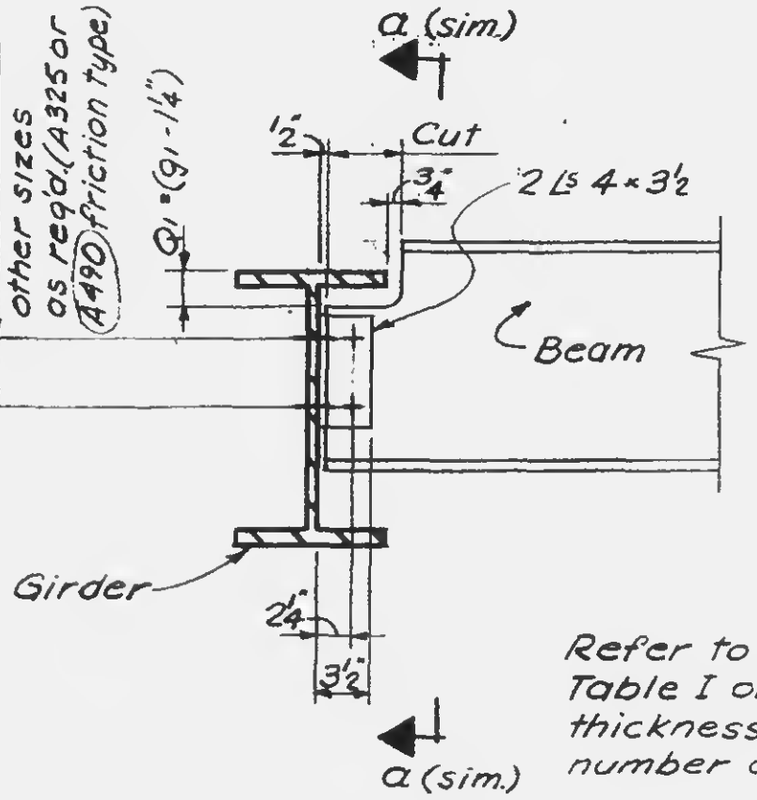


Refer to AISC manual Table I & IV for length & thickness of Ls, number of bolts and size of weld A.



SECTION a-a

WHERE TOP OF BEAM IS SAME OR LESS THAN 6" HIGHER THAN TOP OF GIRDER



Refer to AISC manual Table I or II for length & thickness of Ls and number of bolts.

OPTION

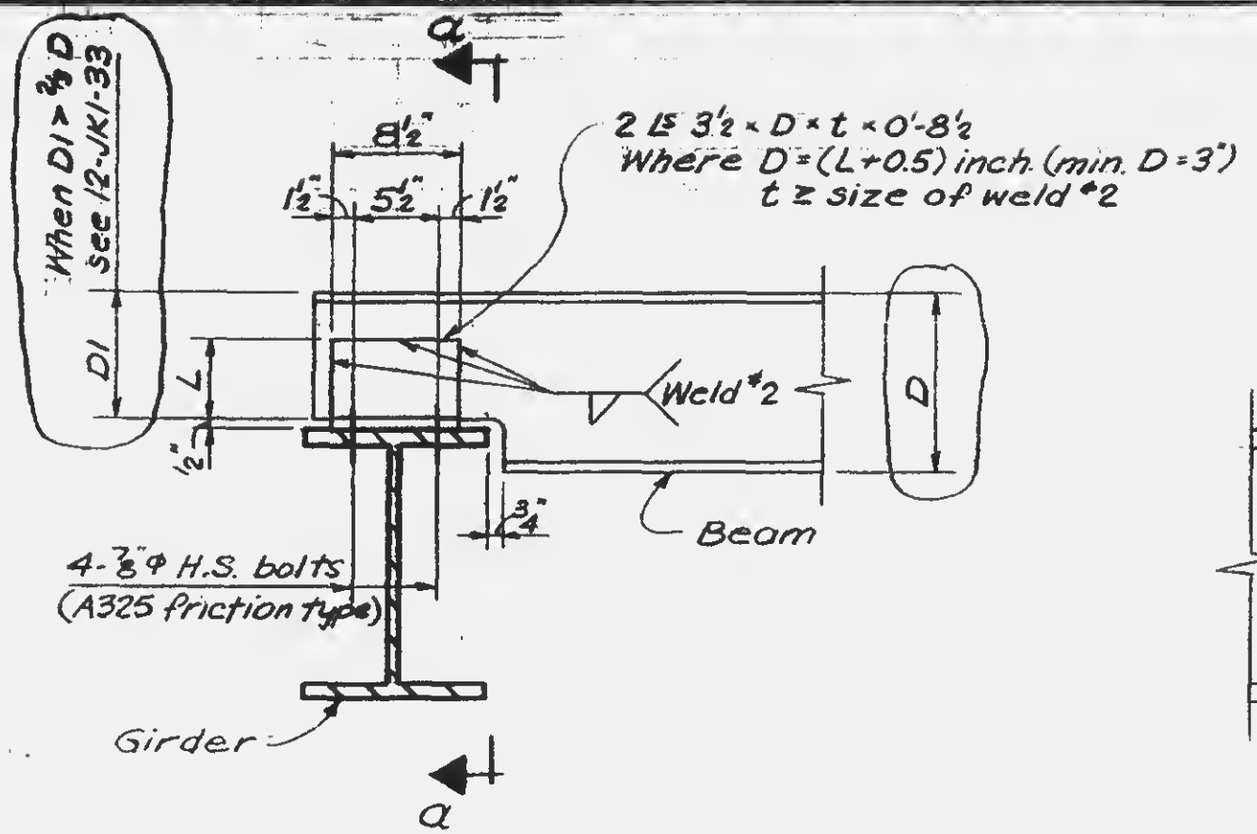
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
STATE OF NEW YORK

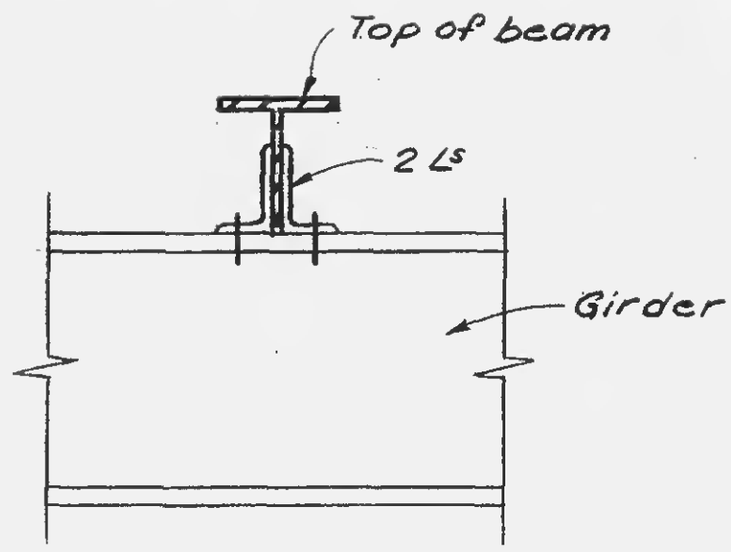
12-JK1-31

REVISIONS

1-5-68

TYPICAL BEAM TO GIRDER CONNECTION





SECTION a-a

$$L\ (\text{inch.}) = \tfrac{1}{2}\left(\frac{\text{Reaction}}{1.4B} - 8.5\right)$$

Min. L = 2½"

Where B = is the number of sixteenths in the weld size

WHERE TOP OF BEAM IS MUCH HIGHER THAN TOP OF GIRDER

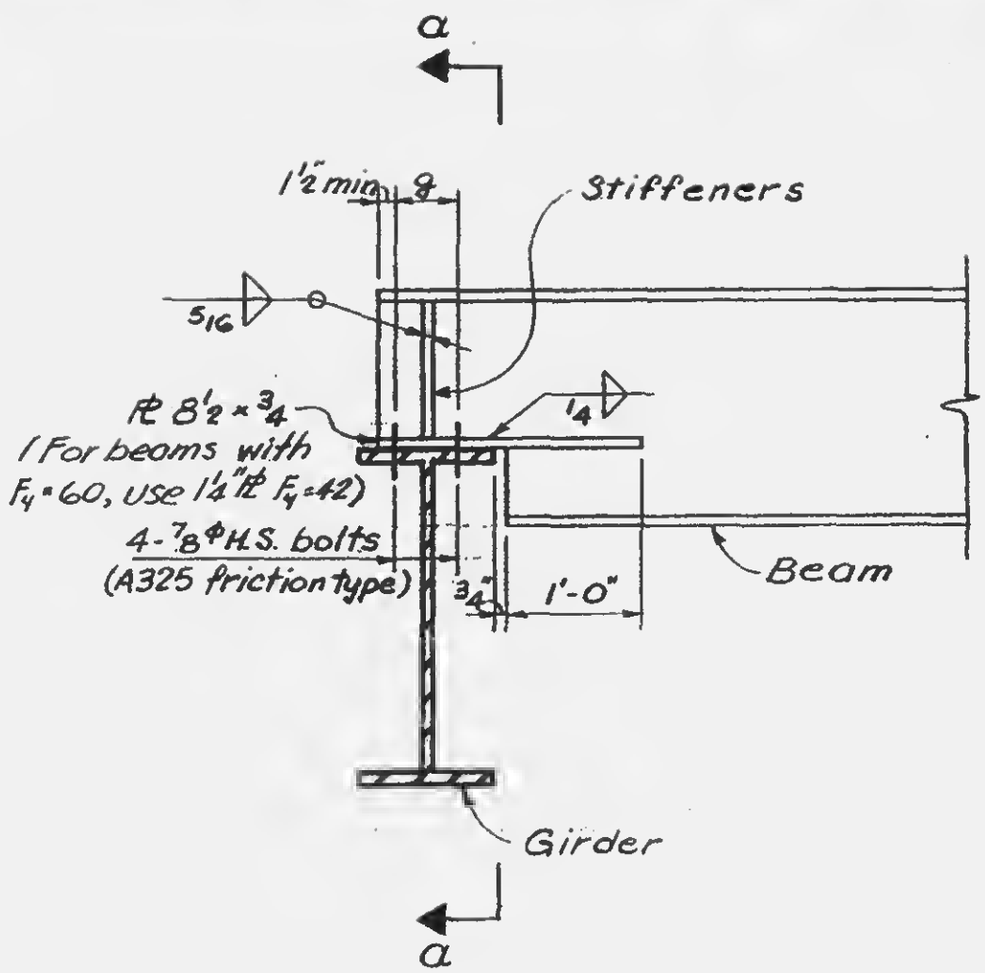
LESLIE E. ROBERTSON
No. 34960

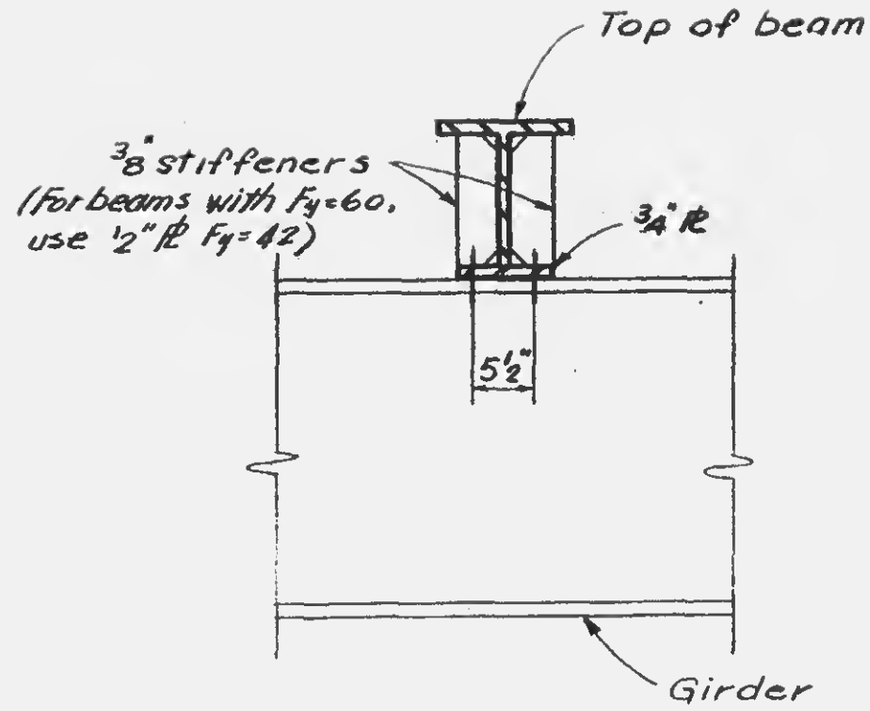
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE TYPICAL BEAM TO GIRDER CONNECTION | 14-C-6

REVISIONS

7-19-68





Section a-a

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No. 34360
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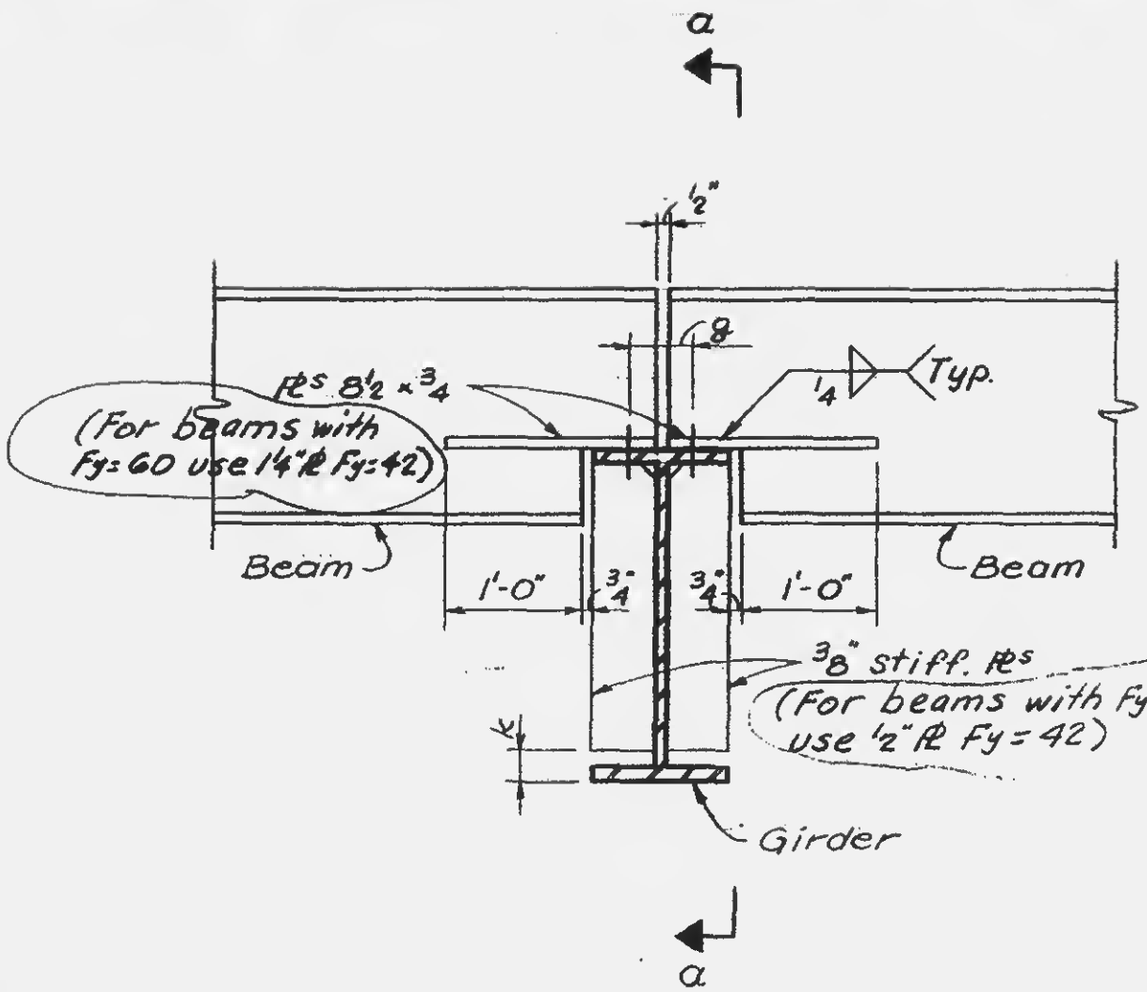
12-JK1-33

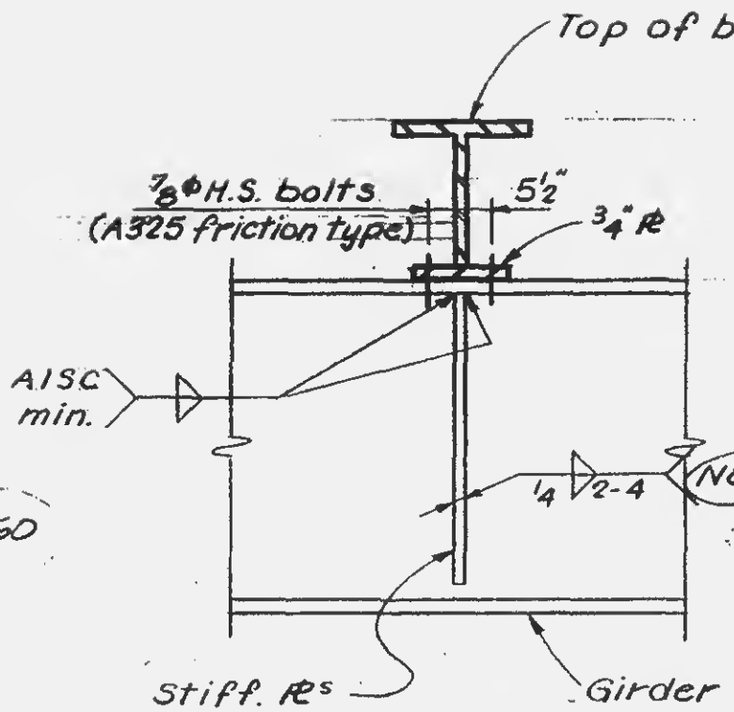
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — STRUCTURAL ENGINEERS

PROJECT THE WORLD TRADE CENTER — TYPICAL BEAM TO GIRDER CONNECTION

REVISIONS

7-19-68





Section a-a

Note:
1. For beams with Fy=60 use 5/16 weld.



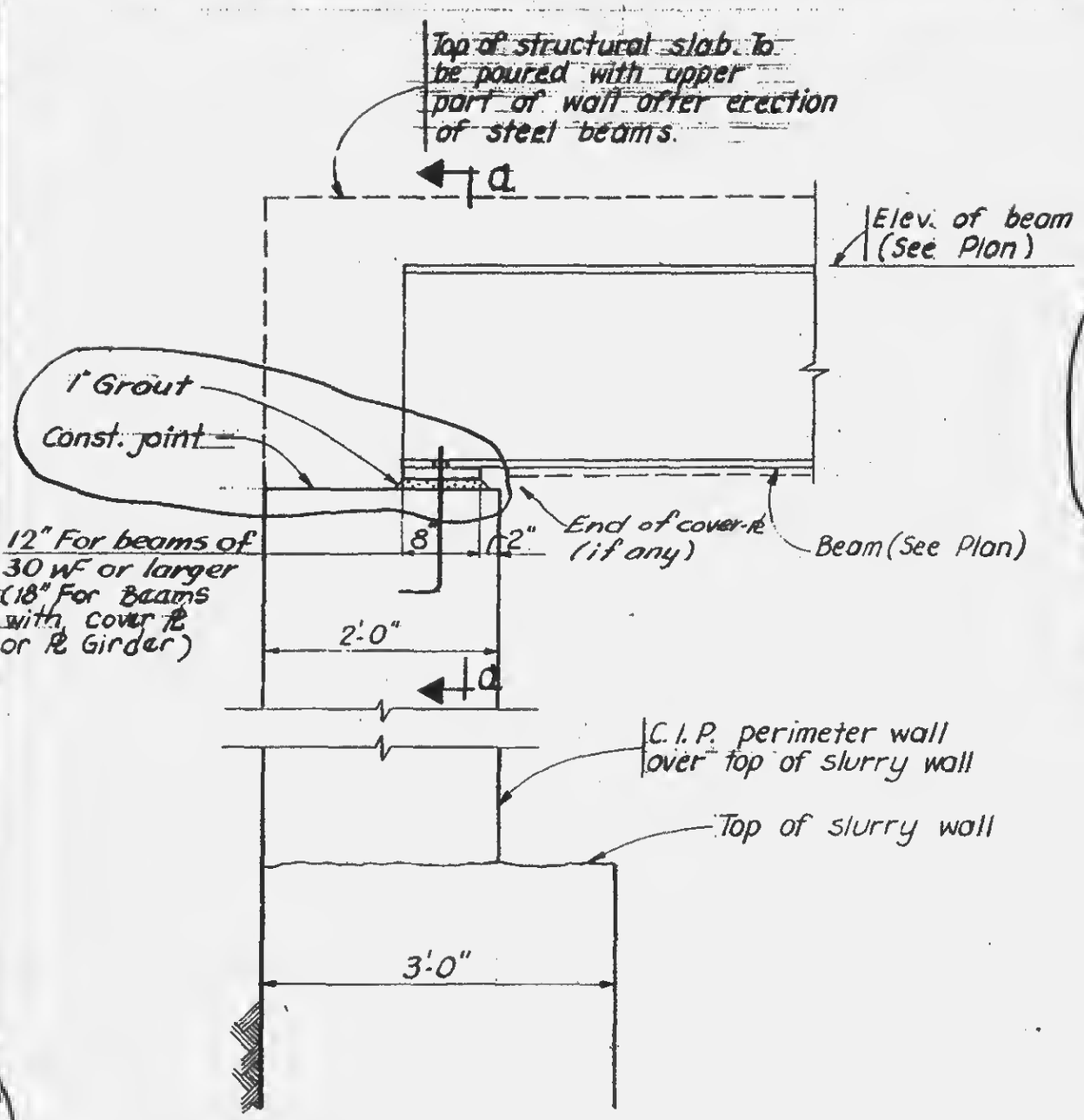
12-JK1-34

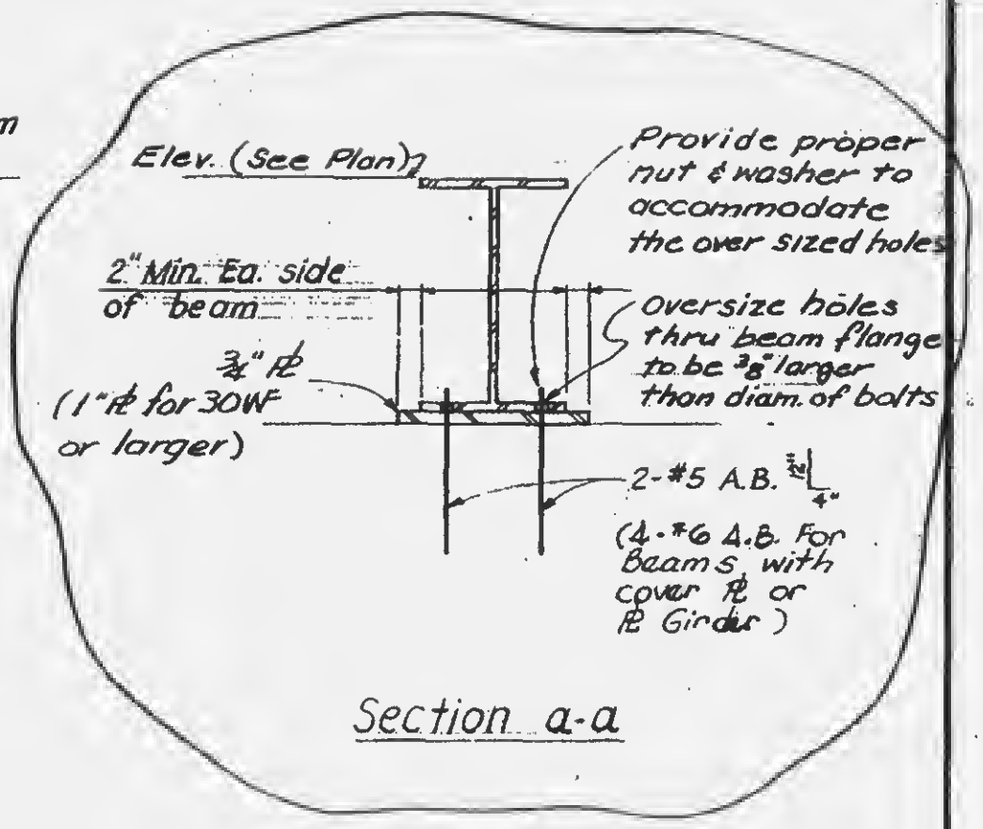
REVISIONS

5-1-68

6-7-68

6-28-68





Section a-a

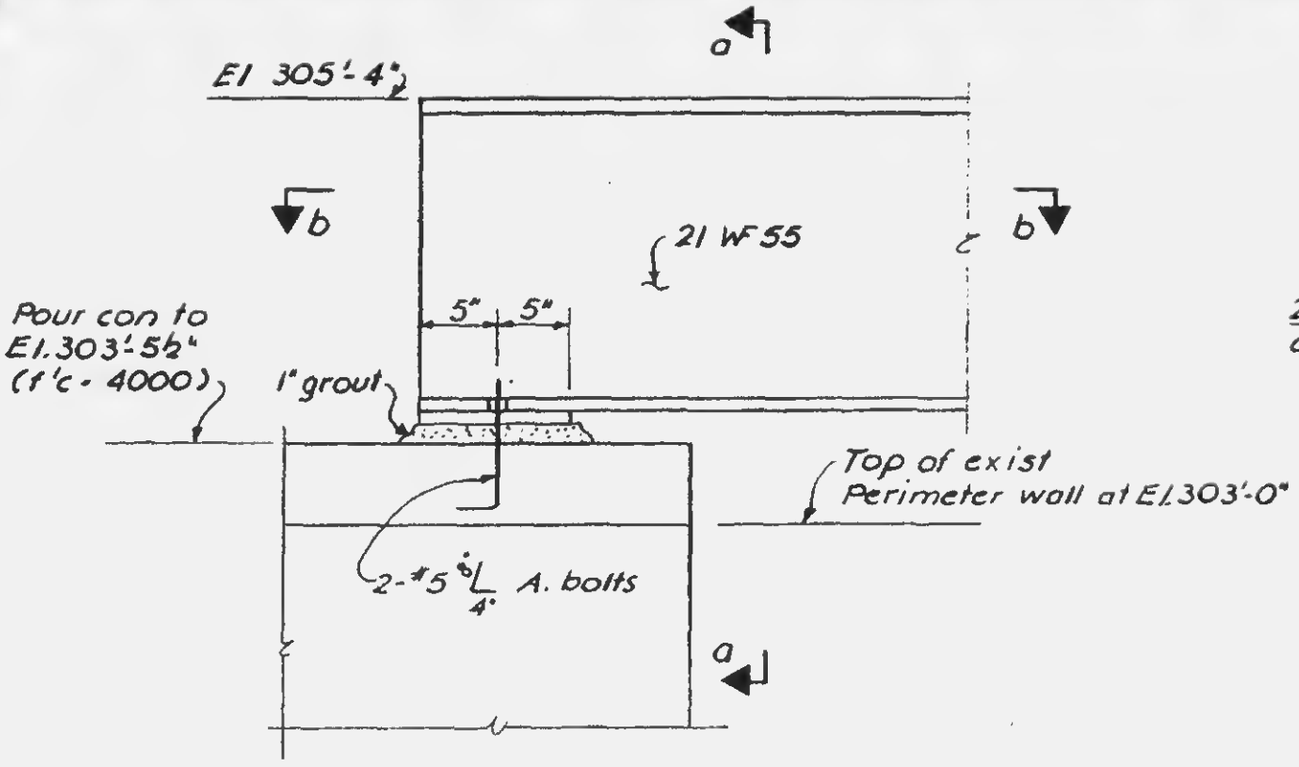
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12-JK1-35

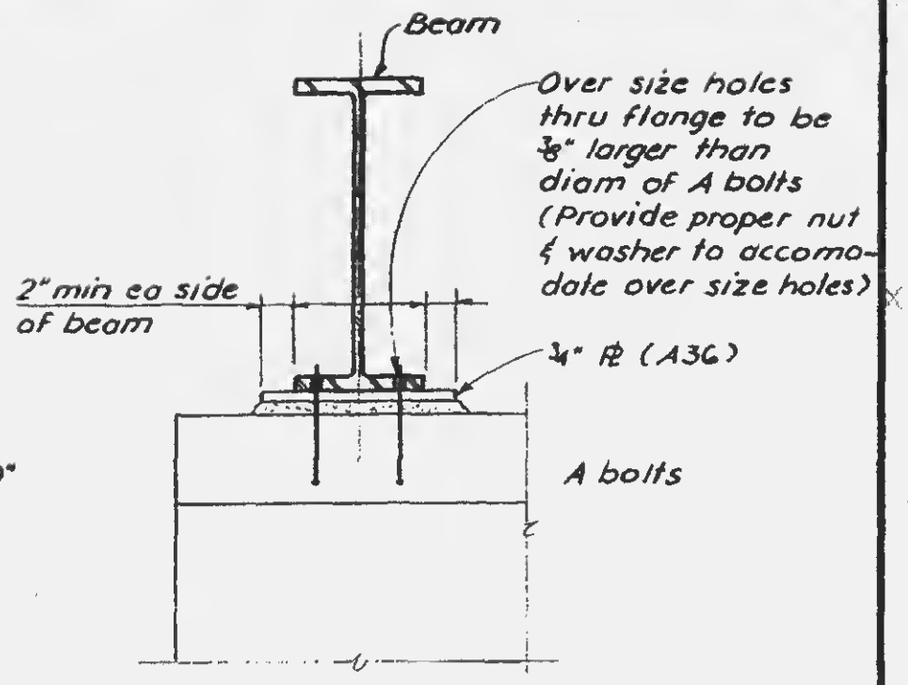
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM SUPPORT OVER TOP OF PERIMETER WALL | DATE: 4-18-69

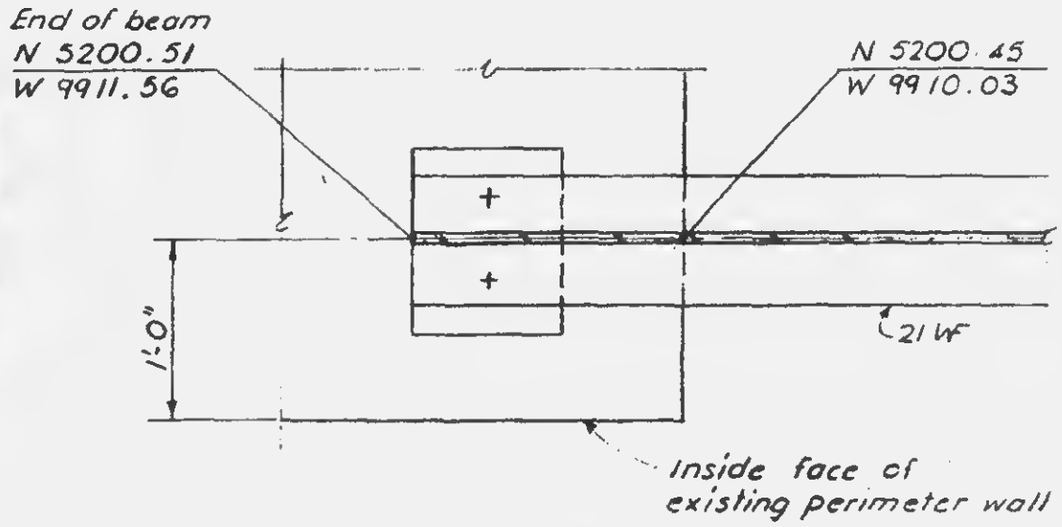
REVISIONS



ELEVATION



Section a-a



Section b-b

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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN
F. Smith

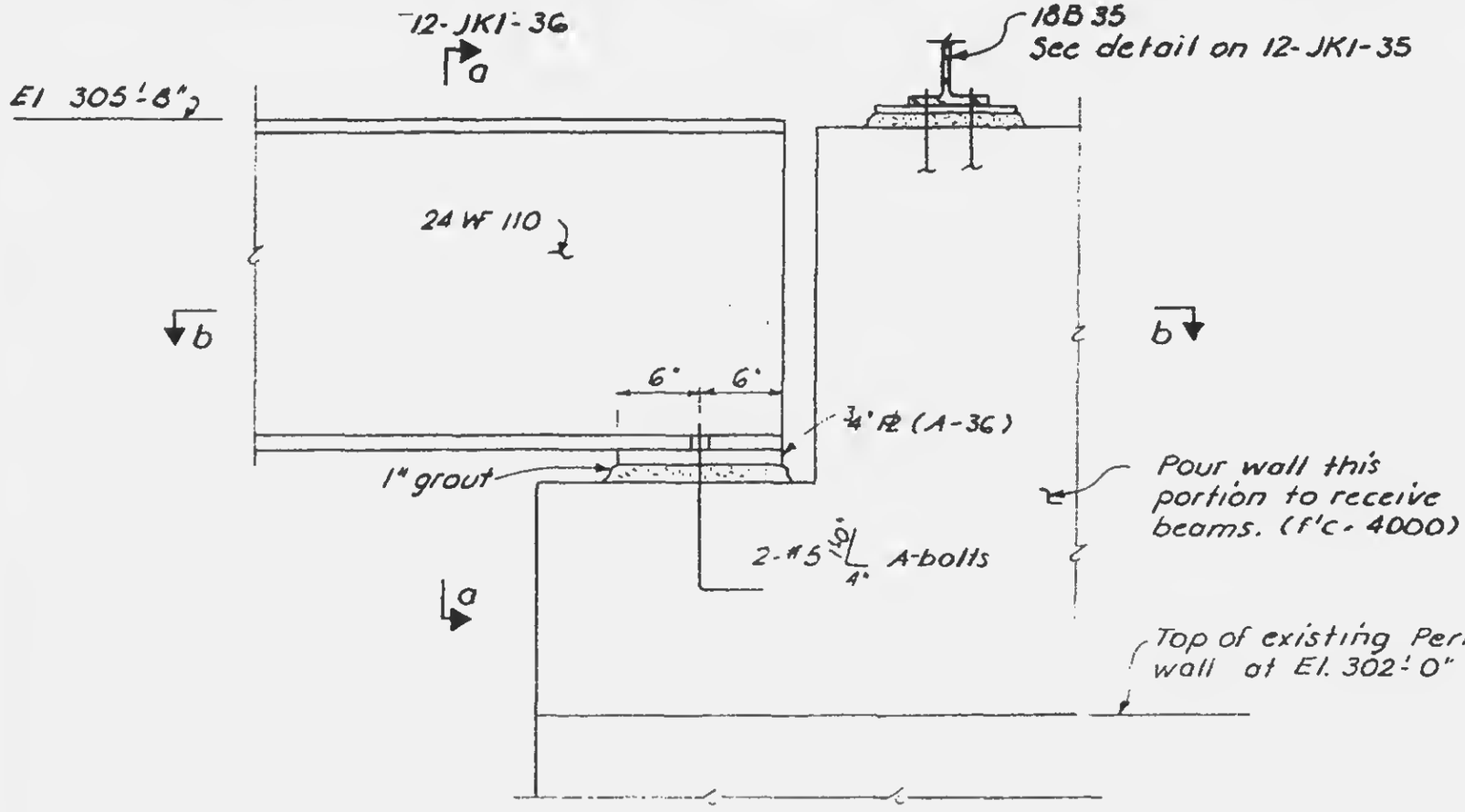
REVIEWED
E.L.

12-JK1-36

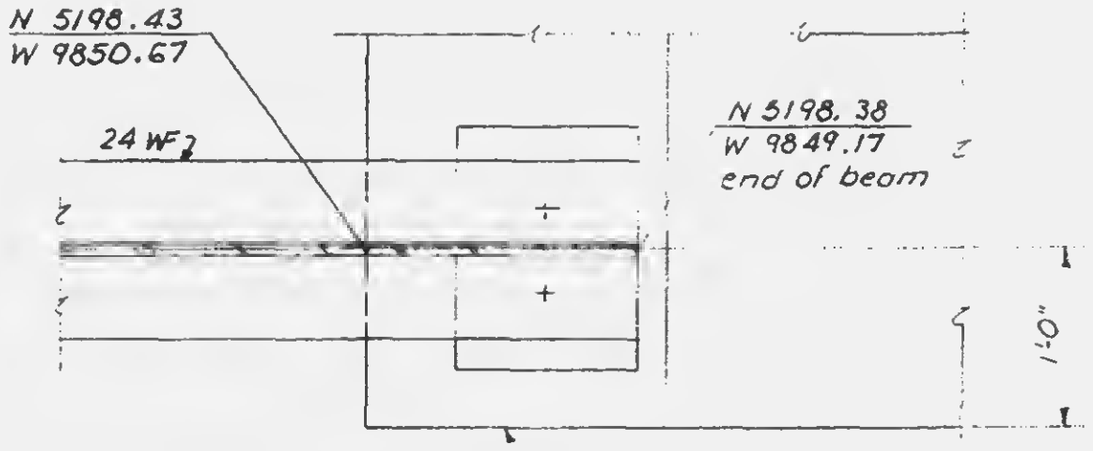
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM SUPPORT OVER TOP OF PERIMETER WALL | DATE: 4-18-69

REVISIONS



ELEVATION



Section b-b

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LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN
F. Smith

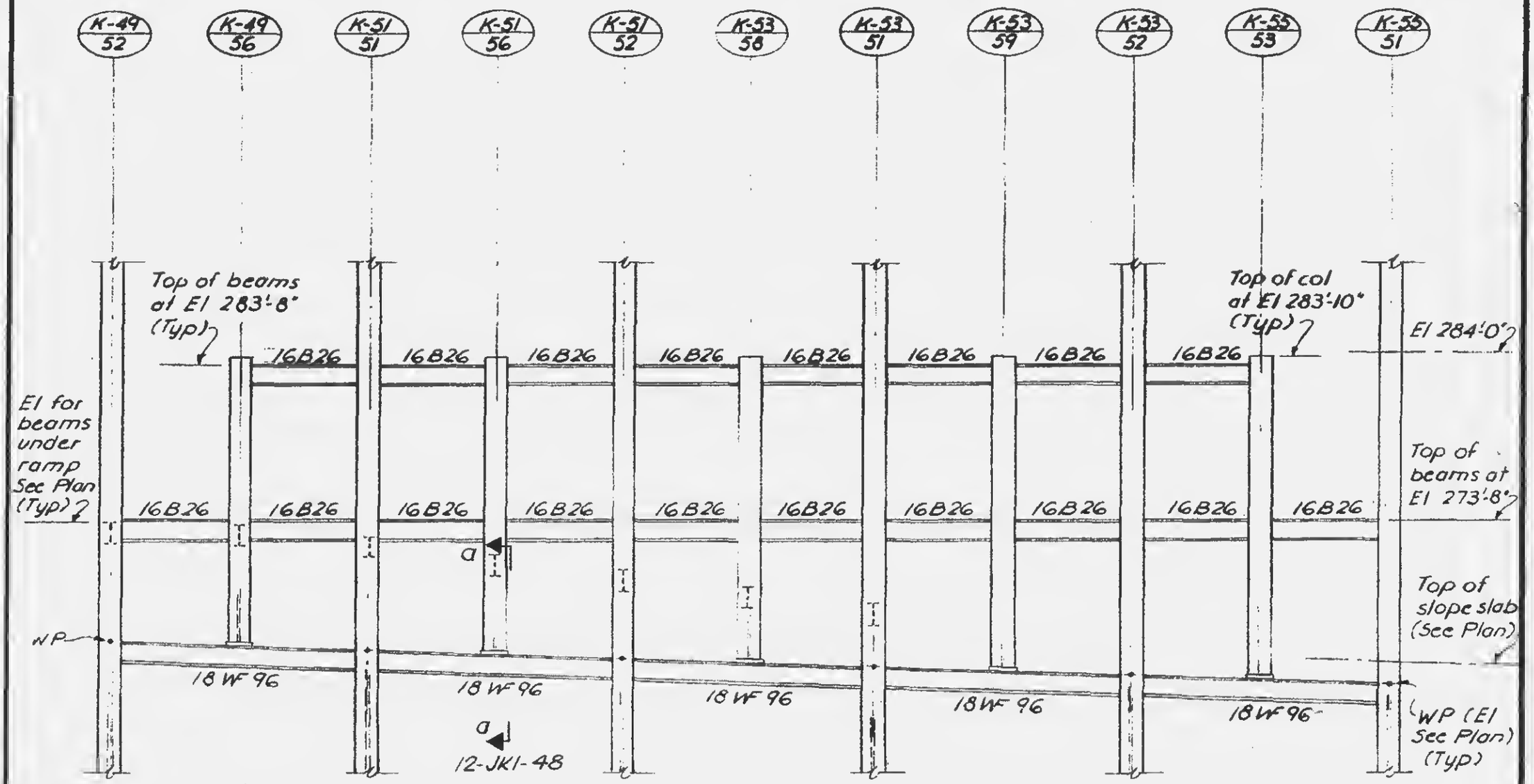
REVIEWED
E.L.

12-JK1-37

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: CONNECTION DETAILS | DATE: 6-13-69

REVISIONS



Elevation
(Looking East)

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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

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F. Smith

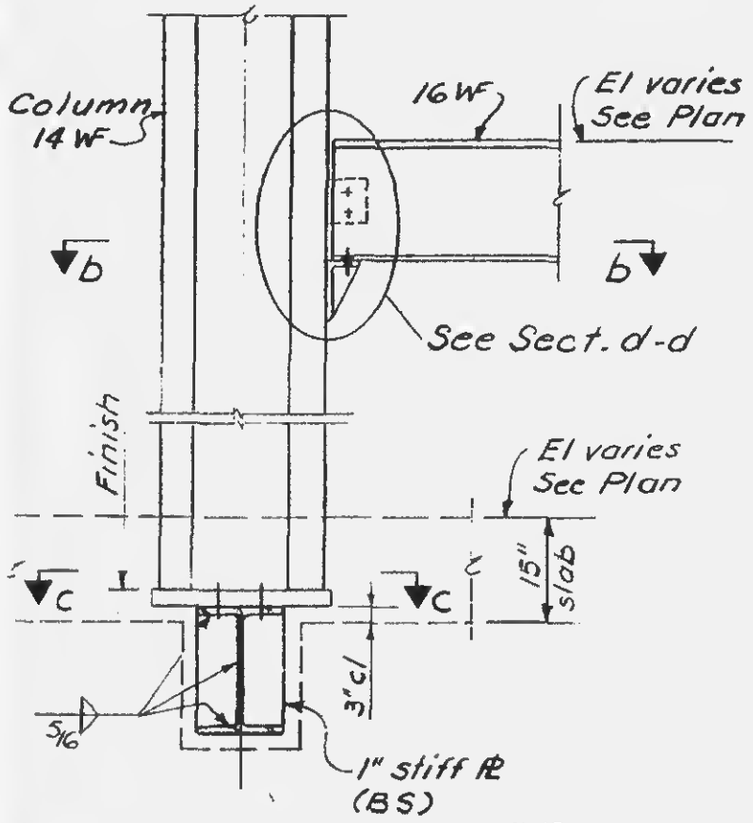
REVIEWED
E.L.

12-JK1-47

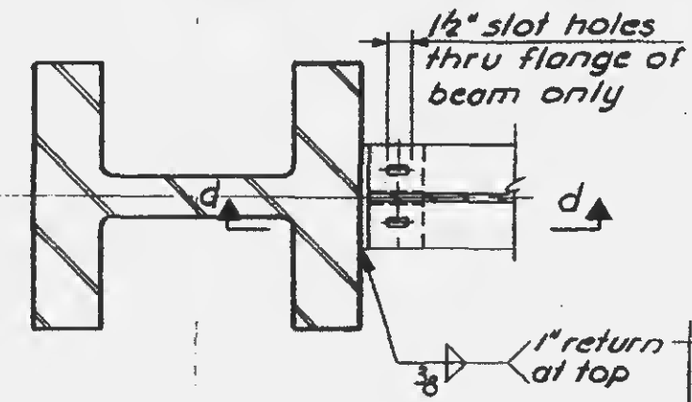
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: CONNECTION DETAILS | DATE: 6-13-69

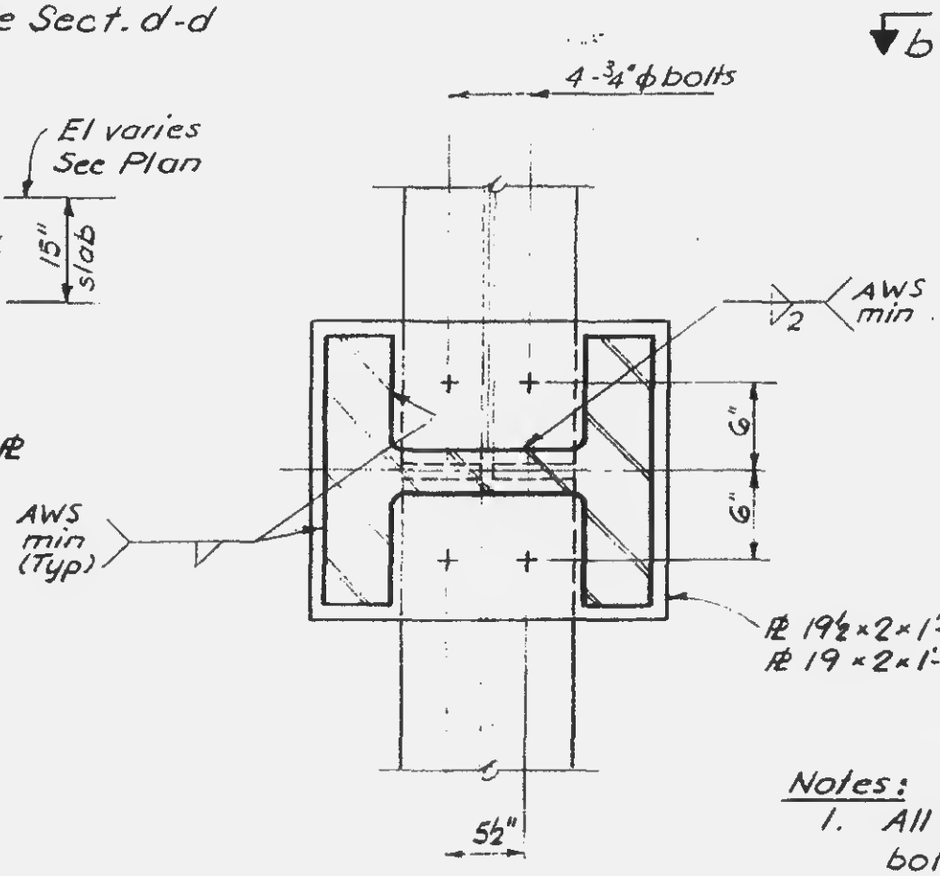
REVISIONS



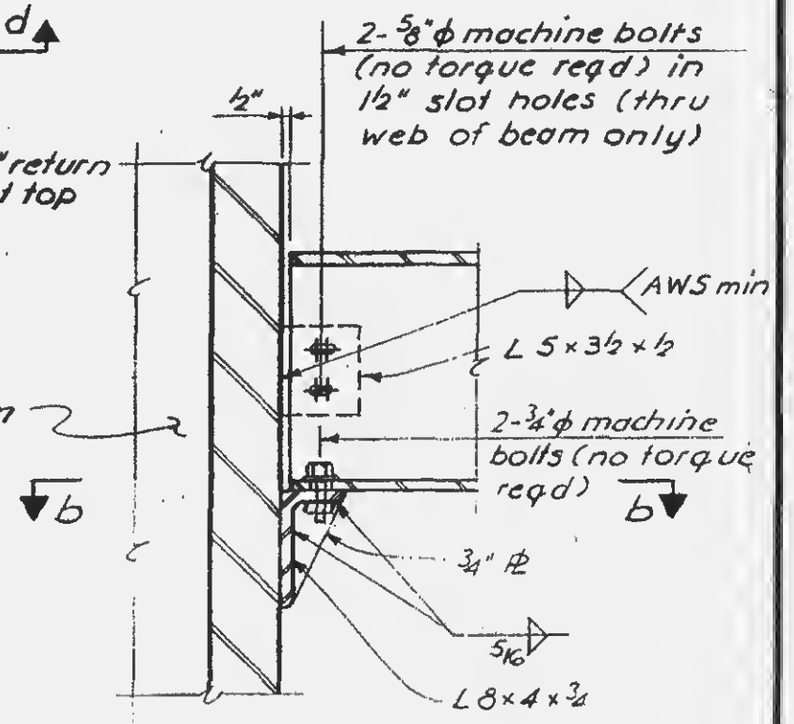
Section a-a
(see 12-JK1-47)



Section b-b



Section c-c



Section d-d

Notes:
1. All bolts shown to be A325 HS bolts (friction type) except as noted.

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DESIGNED

DRAWN: F. Smith

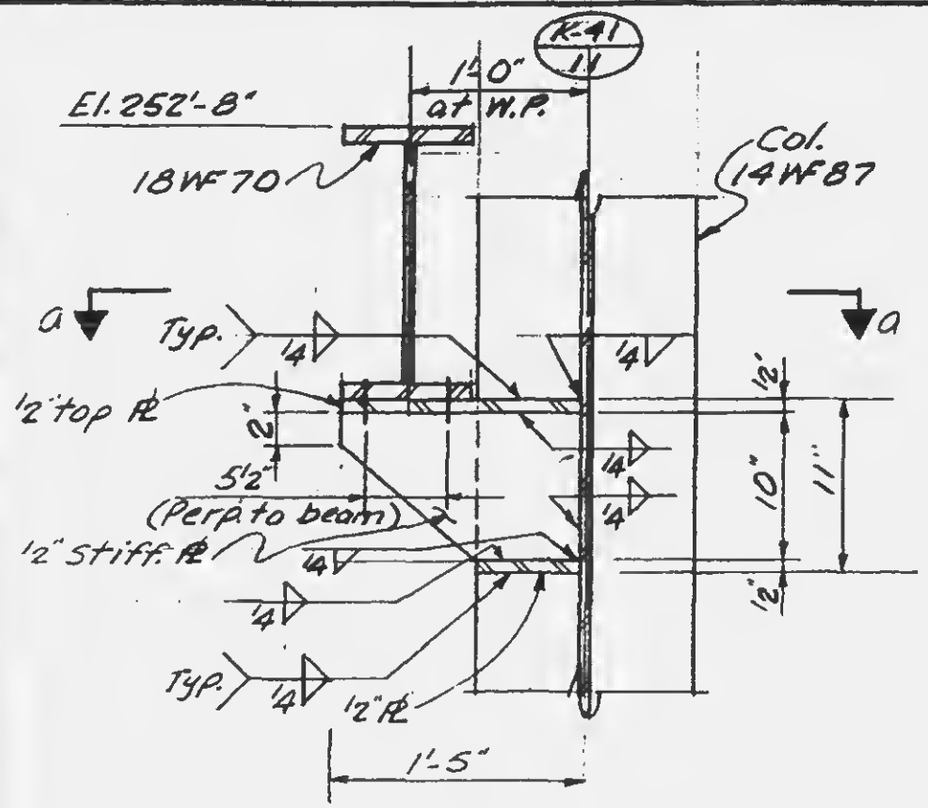
REVIEWED: E.L.

12-JK1-48

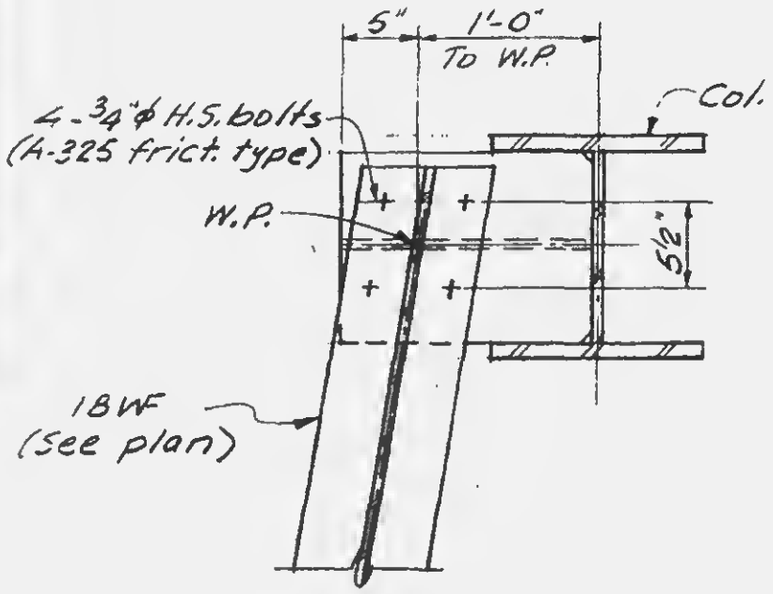
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM CONNECTION DETAILS | DATE: 12-3-68

REVISIONS



ELEVATION



Section a-a

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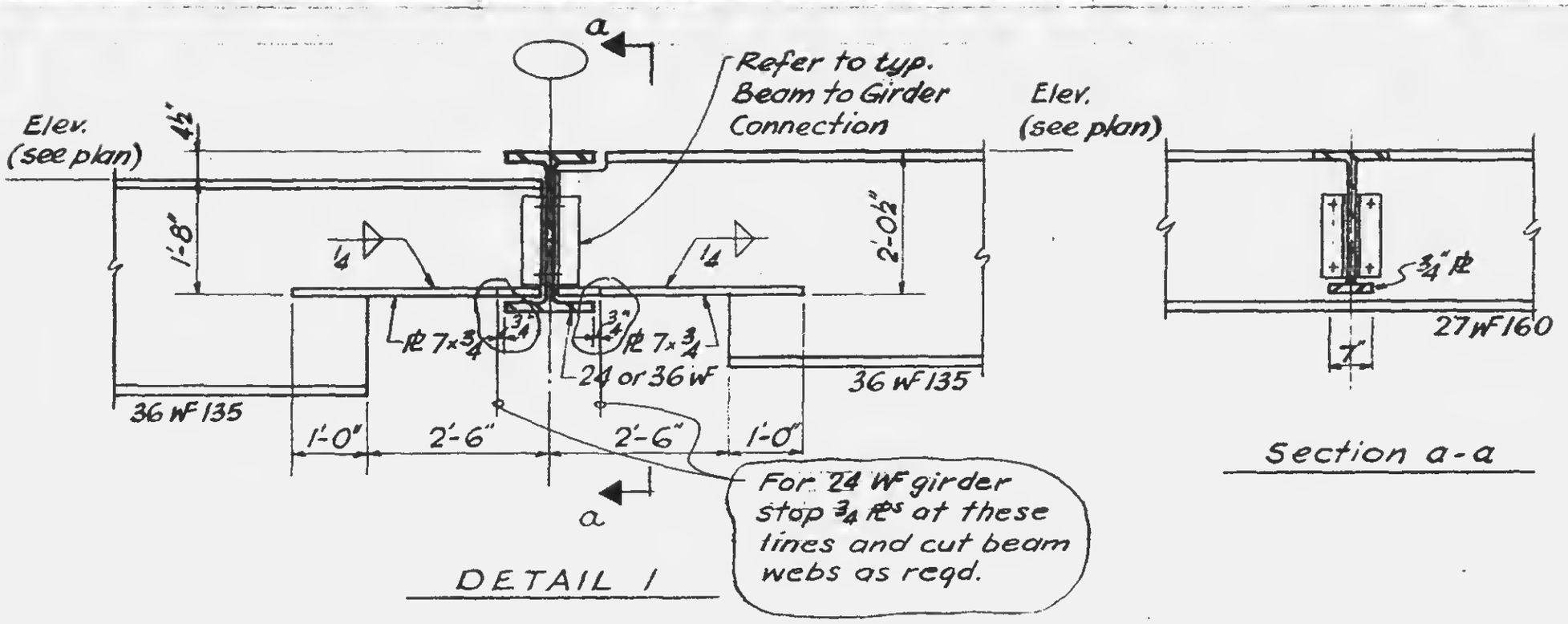
REVIEWED

12-JK1-49

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — STRUCTURAL ENGINEERS

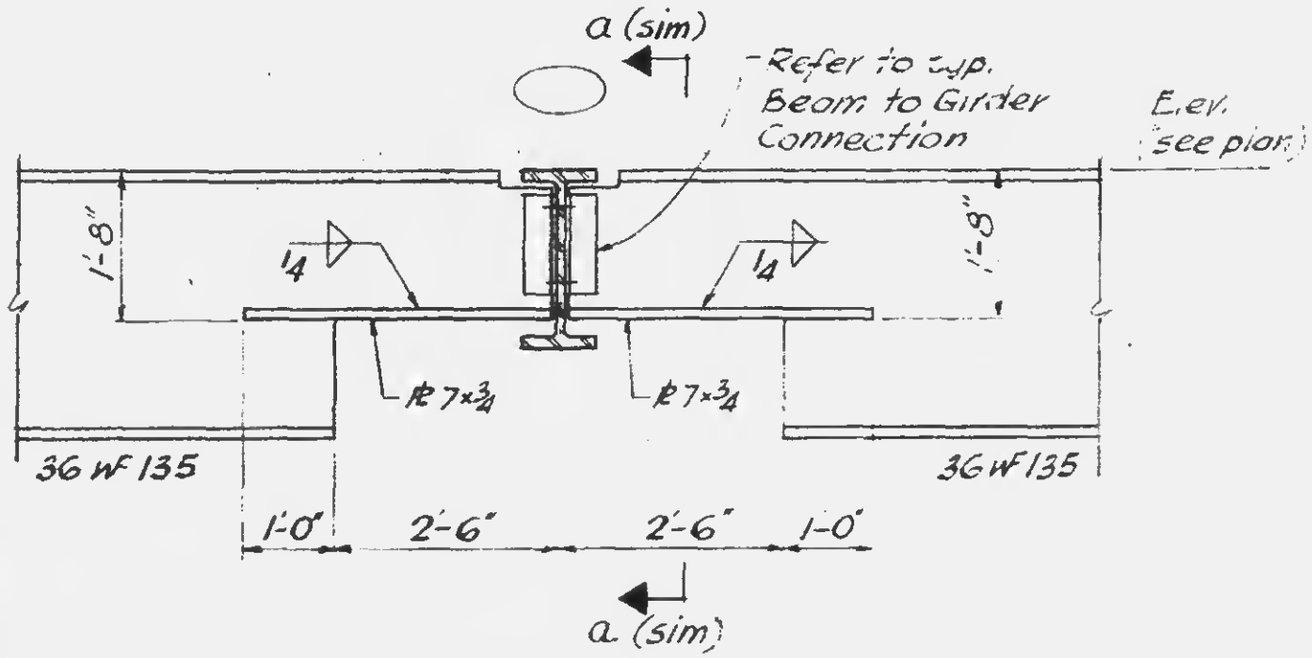
PROJECT THE [illegible] TRADE CENTER | TITLE BEAM CONNECTION DETAILS | DATE 10-20-67

REVISIONS
1-5-68



DETAIL 1

Section a-a



DETAIL 2

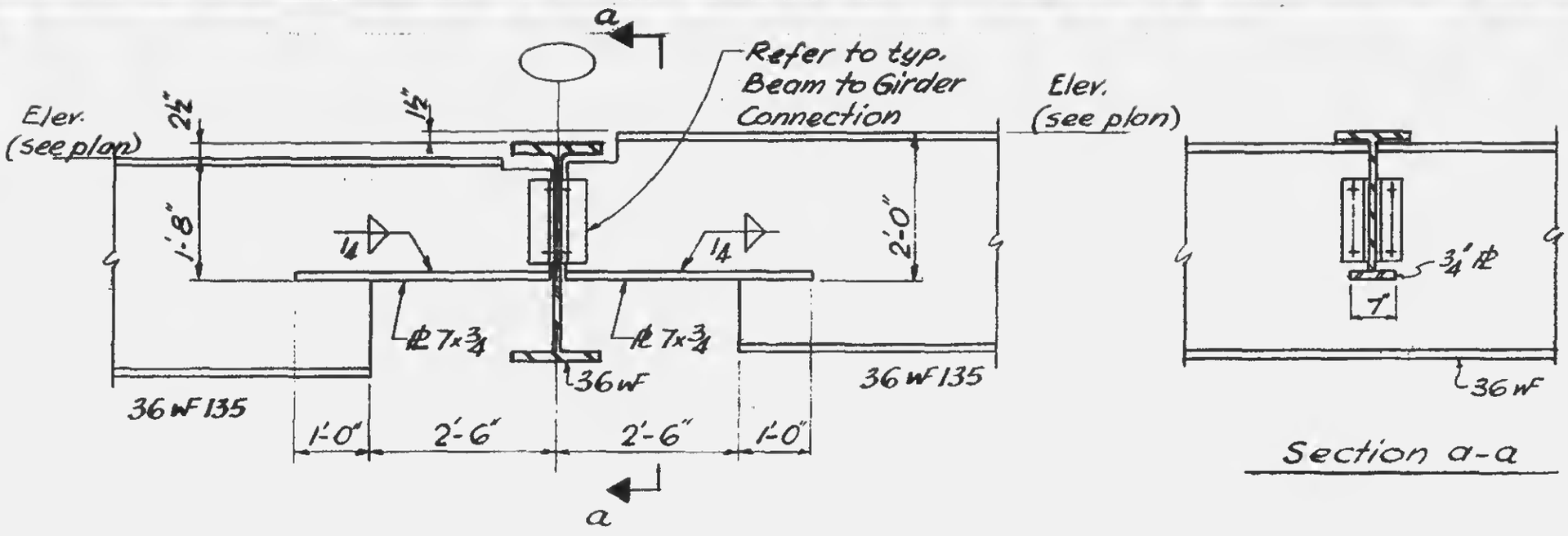
LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34960 — UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-50

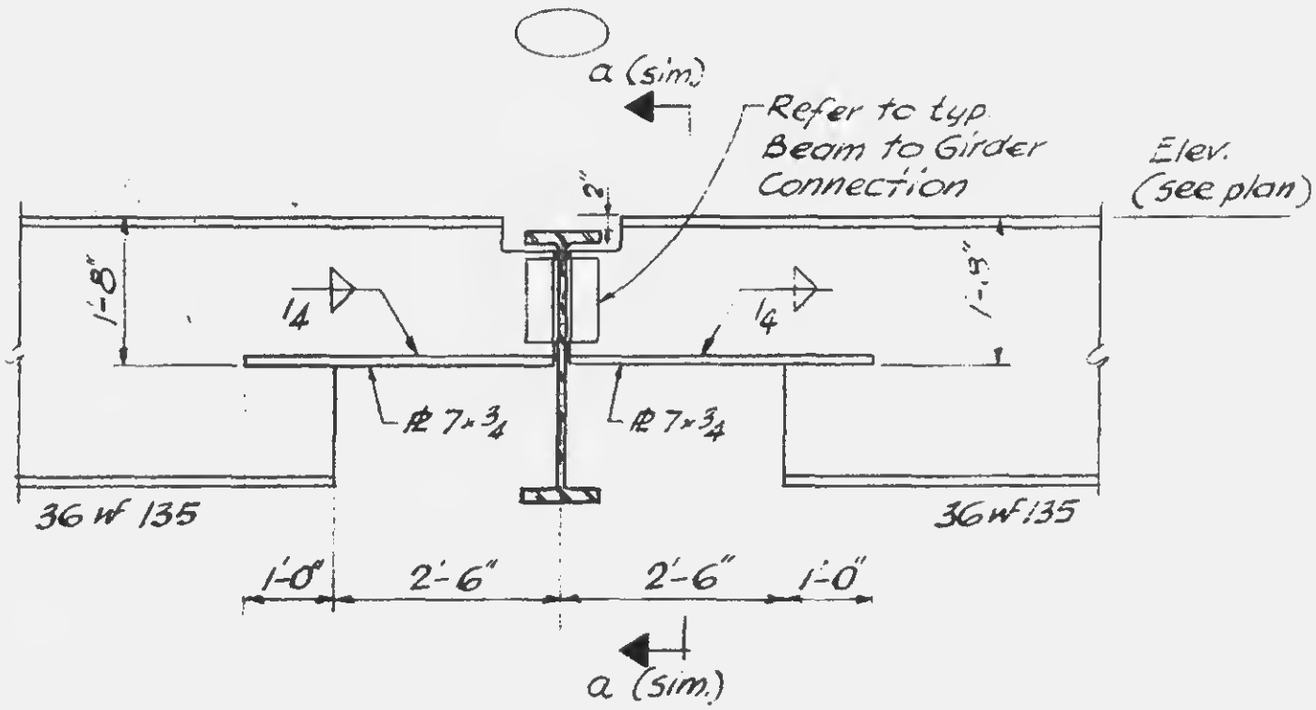
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — STRUCTURAL & CIVIL Engineers

PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAILS | DATE 10-20-67

REVISIONS



DETAIL 3

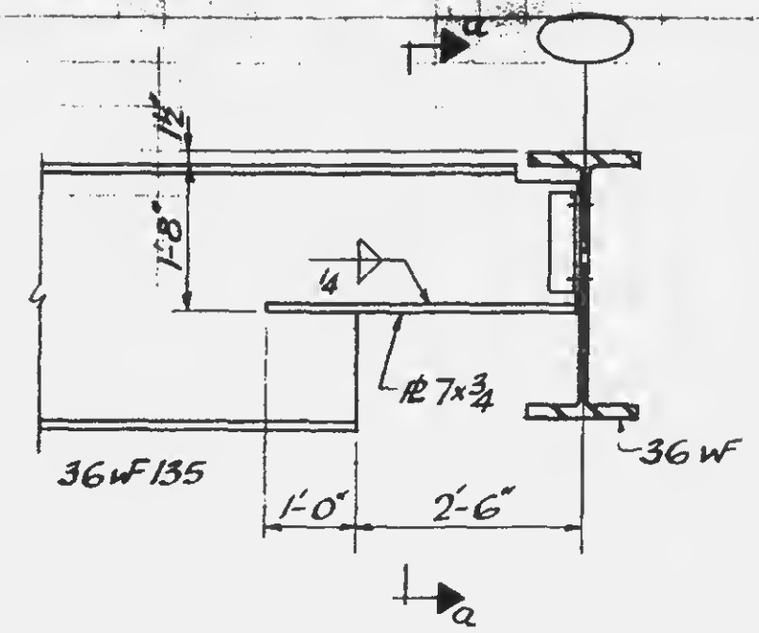


DETAIL 4

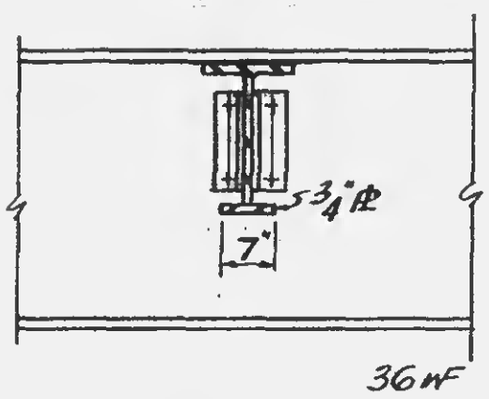
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12-JK-51

REVISIONS



DETAIL 5



Section a-a

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12-JK1-52

REVISIONS

6-7-68

TYPE OF CONNECTIONS

COLUMN No.	FLOOR AT EL. 257'				BELOW FLOOR EL. 284'			
	N	S	E	W	N	S	E	W
K31-3							II	
K31-4	III	III	I-A					
K31-5	III	III	I	I-A	III	III	II	II
K31-6	III	III	I	I	III	III	II	II
K31-7	III	III	I	I	III	III	II	II
K31-8	III	III	I	I	III	III	II	II
K31-9	III	III	I	I	III	III	II	II
K31-10	III	III	I	I			II	II
K31-11	I	I	III	III				
K31-12	I	I	III	III				
K29-4		I						

TYPE OF CONNECTIONS

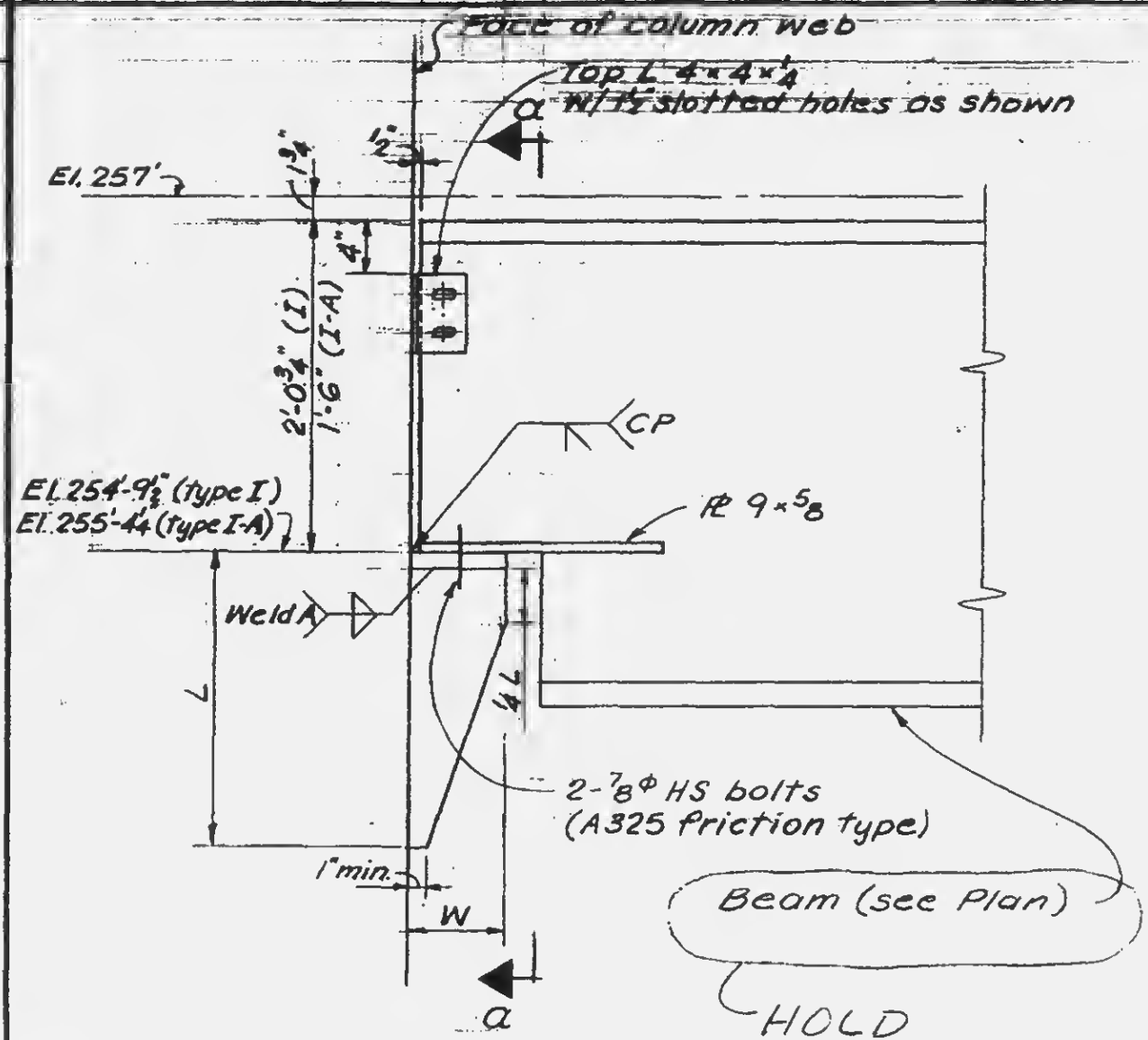
COLUMN No.	FLOOR AT EL. 257'				BELOW FLOOR EL. 284'			
	N	S	E	W	N	S	E	W
K35-2							II	
K35-3	III	III	I-A					
K35-4	III	III	I	I-A	III	III	II	II
K35-5	III	III	I	I	III	III	II	II
K35-6	III	III	I	I	III	III	II	II
K35-7	III	III	I	I	III	III	II	II
K35-8	III	III	I	I	III	III	II	II
K35-9	III	III	I	I	III	III	II	II
K35-10	III	III	I	I		III		II
K35-11	I	I	III	III				
K35-12	I	I	III	III				
K70-4				III				
K70-5				III				
K70-6				III				

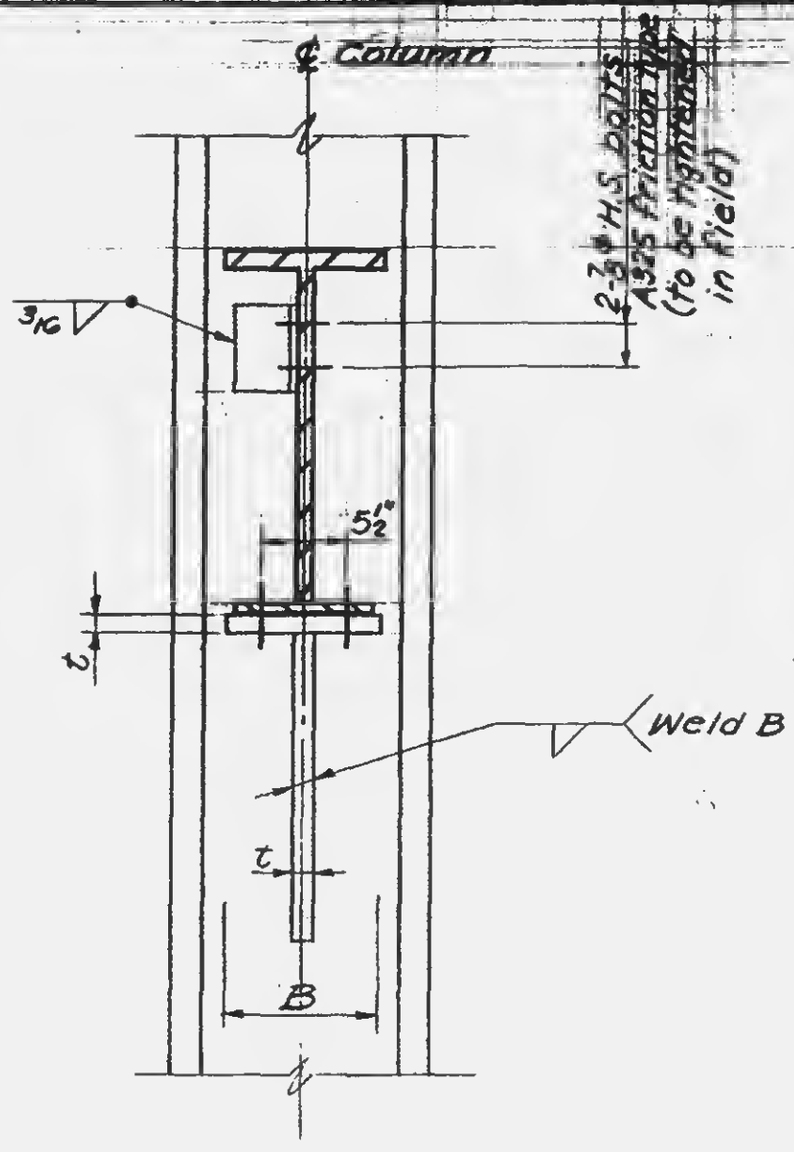
NOTES:

1. Provide the connections called out in the schedule to all columns shown. Some or a portion of these connections may have to be removed after the determination of exact beam sizes and locations within this area — (subject to the final machine layout in refrigeration room)
2. Refer to the following drawings for detail of connections: -
   Type I & I-A —— 12-JK1-54
   Type II —— 12-JK1-55
   Type III —— 12-JK1-56

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REVISIONS





Section a - a

	TYPE I	TYPE I-A
L	1'-10"	1'-3"
W	7"	4"
B	10"	8½"
t	1⅜"	½"
WELD A	7/16"	⅜"
WELD B	7/16" *	⅜"

* Use ½" weld for column @ web thickness greater than 2¼".
All welds to be E70 xx.

TYPE I & TYPE I-A

Provide this type of connection to columns within refrigeration room area.
(See schedule on 12-JKI-53 for locations)

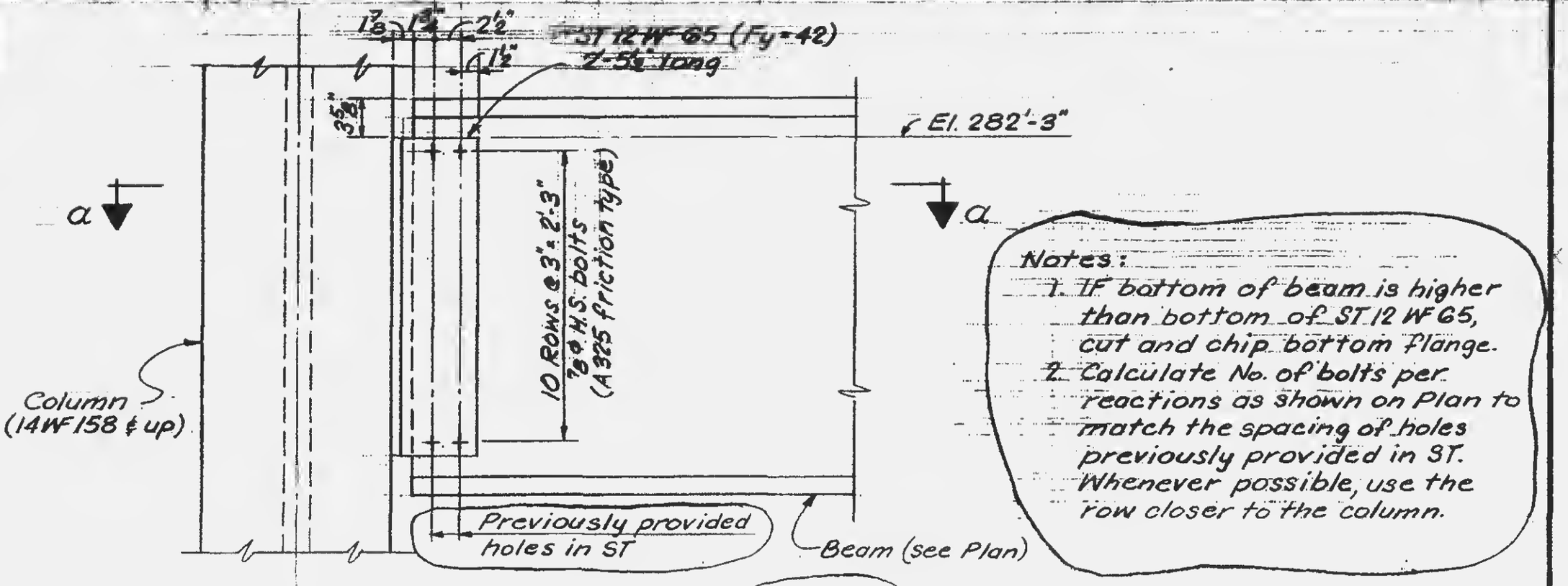
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LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JKI-54

REVISIONS

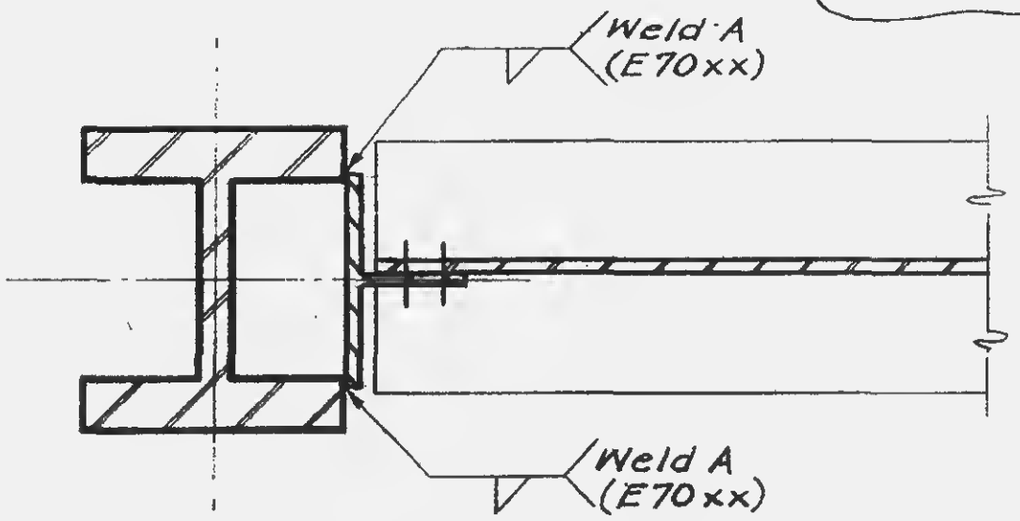
11-27-68

PROJECT



Notes:

1. If bottom of beam is higher than bottom of ST 12 WF 65, cut and chip bottom flange.
2. Calculate No. of bolts per reactions as shown on Plan to match the spacing of holes previously provided in ST. Whenever possible, use the row closer to the column.



WELD A:

⅜" weld for columns with flange thickness 2¼" and less.
½" weld for columns with flange thickness greater than 2¼".
Provide full return at top.

Section a-a

TYPE II

Provide this type of connection to columns within refrigeration room area. (See schedule on 12-JK1-53 for location)

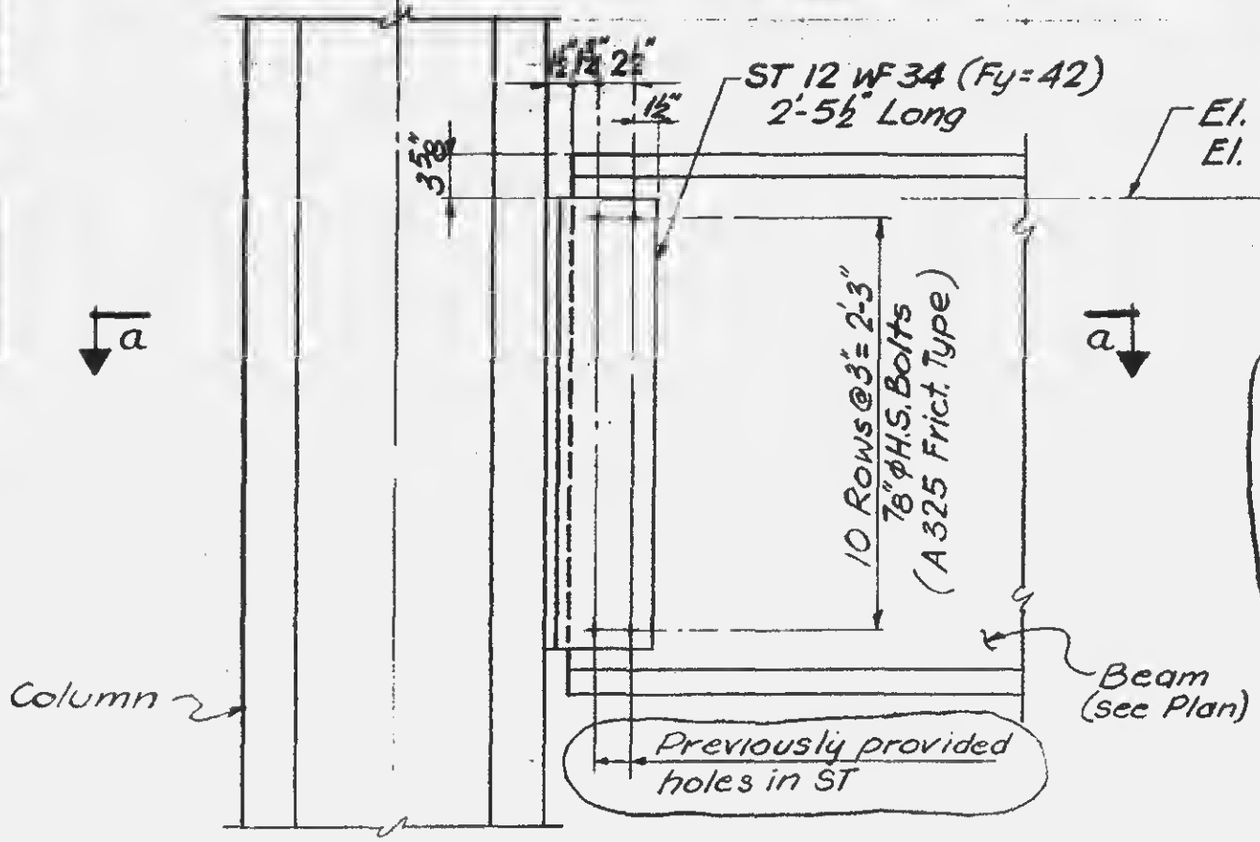
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12-JK1-55

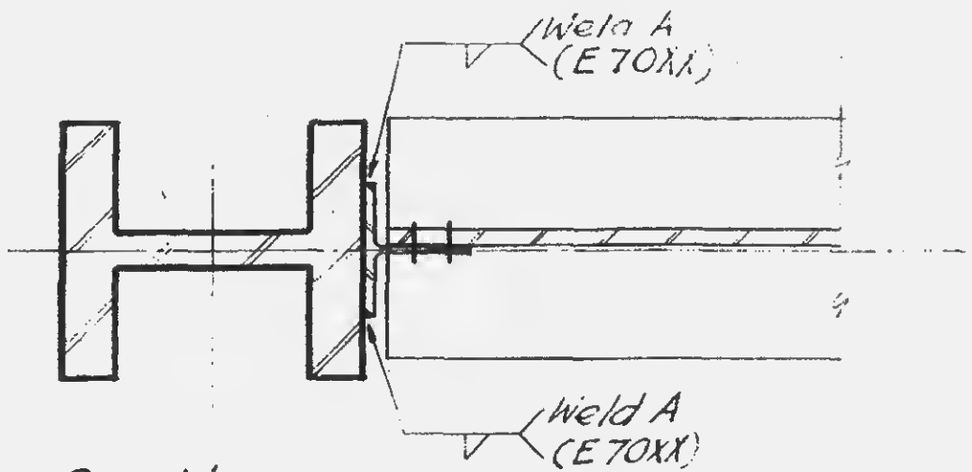
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON

PROJECT THE WORLD TRADE CENTER — TYP. COMN. FOR COLS. WITHIN REFRIG. RM. AREA — DATE 11-24-67

REVISIONS
11-27-68



Notes:
1. IF bottom of beam is higher than bottom of ST 12 WF 34, cut and chip bottom flange.
2. Calculate No. of bolts per reactions as shown on Plan to match the spacing of holes previously provided in ST. Whenever possible, use the row closer to the column.



Section a-a

Provide this type of connection to columns within Refrigeration room area
(See Schedule on 12-JKI-53 for location)

TYPE III

WELD A:

⅜" weld for Col. with flange thickness 2¼" and less
½" weld for Col. with flange thickness greater than 2¼"
Provide 1" return at top.

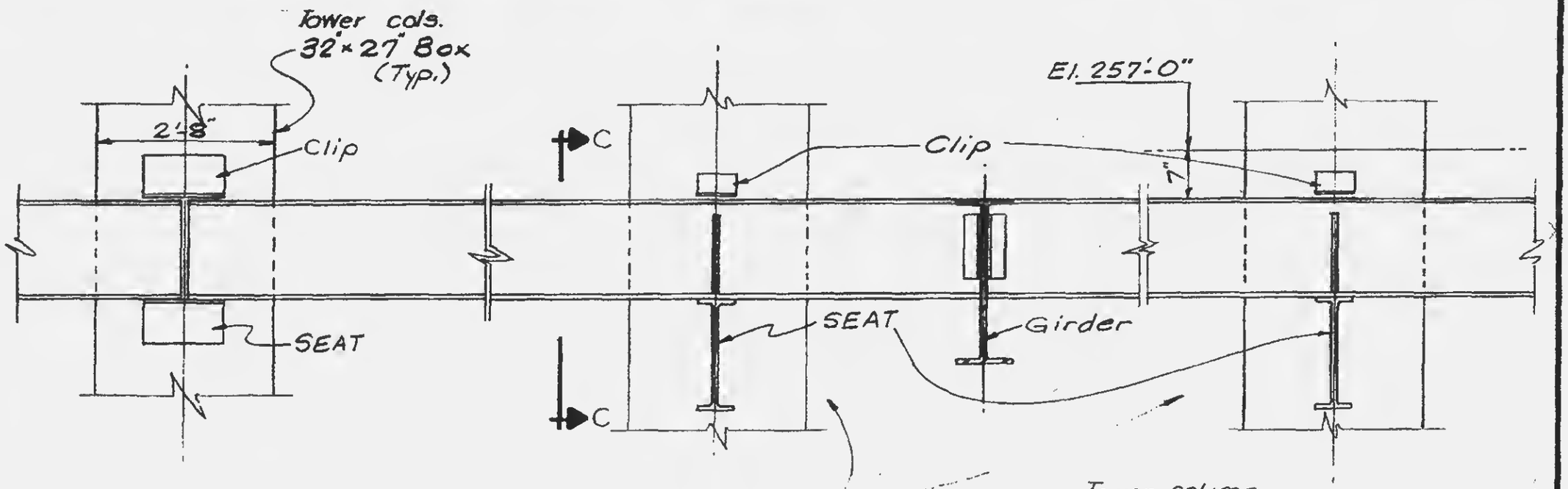
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12-JKI-56

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PROJECT THE WORLD TRADE CENTER | TITLE BEAM TO COL. CONN. FOR COL'S WITHIN REFRIG. RM. AREA | DATE 10-15-68

REVISIONS

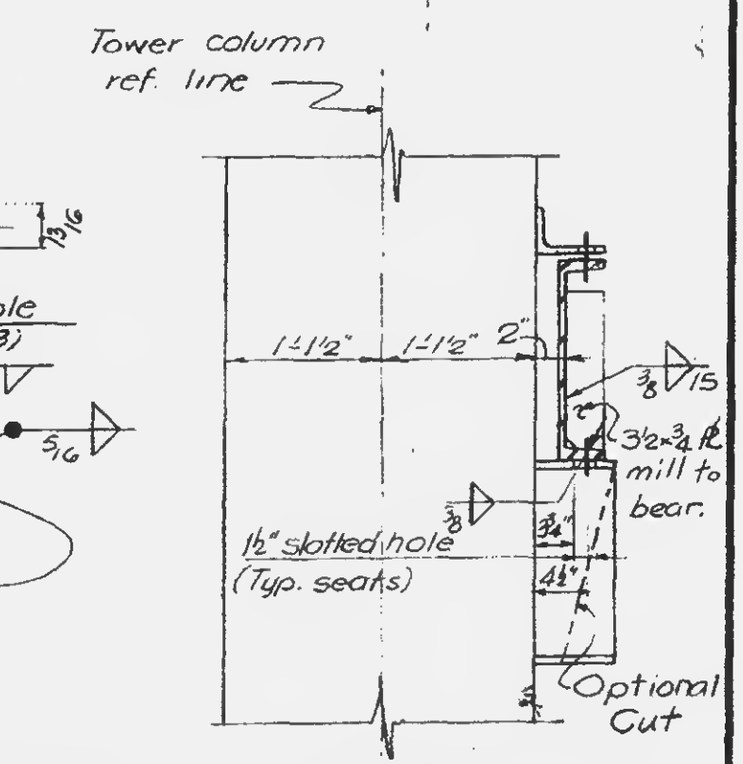


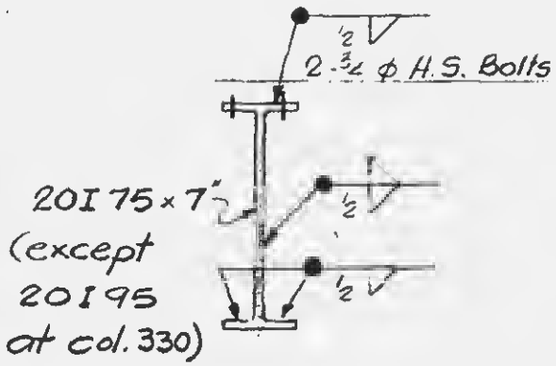
DETAIL 'B'

Use at cols. not adjacent to a girder.

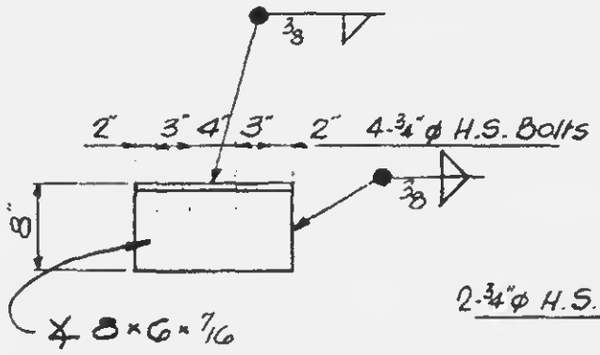
DETAIL 'A'

Typ. at cols. adjacent to Girder.



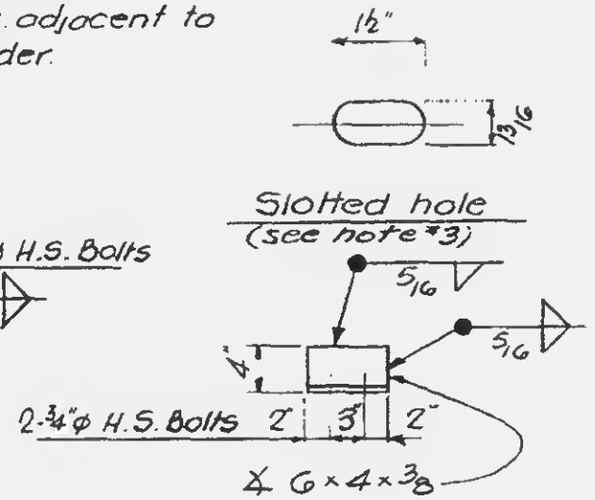


SEAT FOR DETAIL 'A'



SEAT FOR DETAIL 'B'

(Reverse = clip for Detail 'B')



CLIP FOR DETAIL 'A'

SECTION C-C

Notes:

1. All H.S. Bolts to be A-325 friction type, ¾" dia.
2. All welding to be E70xx
3. Holes in ext. flg. of L's to be slotted longitudinally; in seats & clips transversely.

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DESIGNED

DRAWN

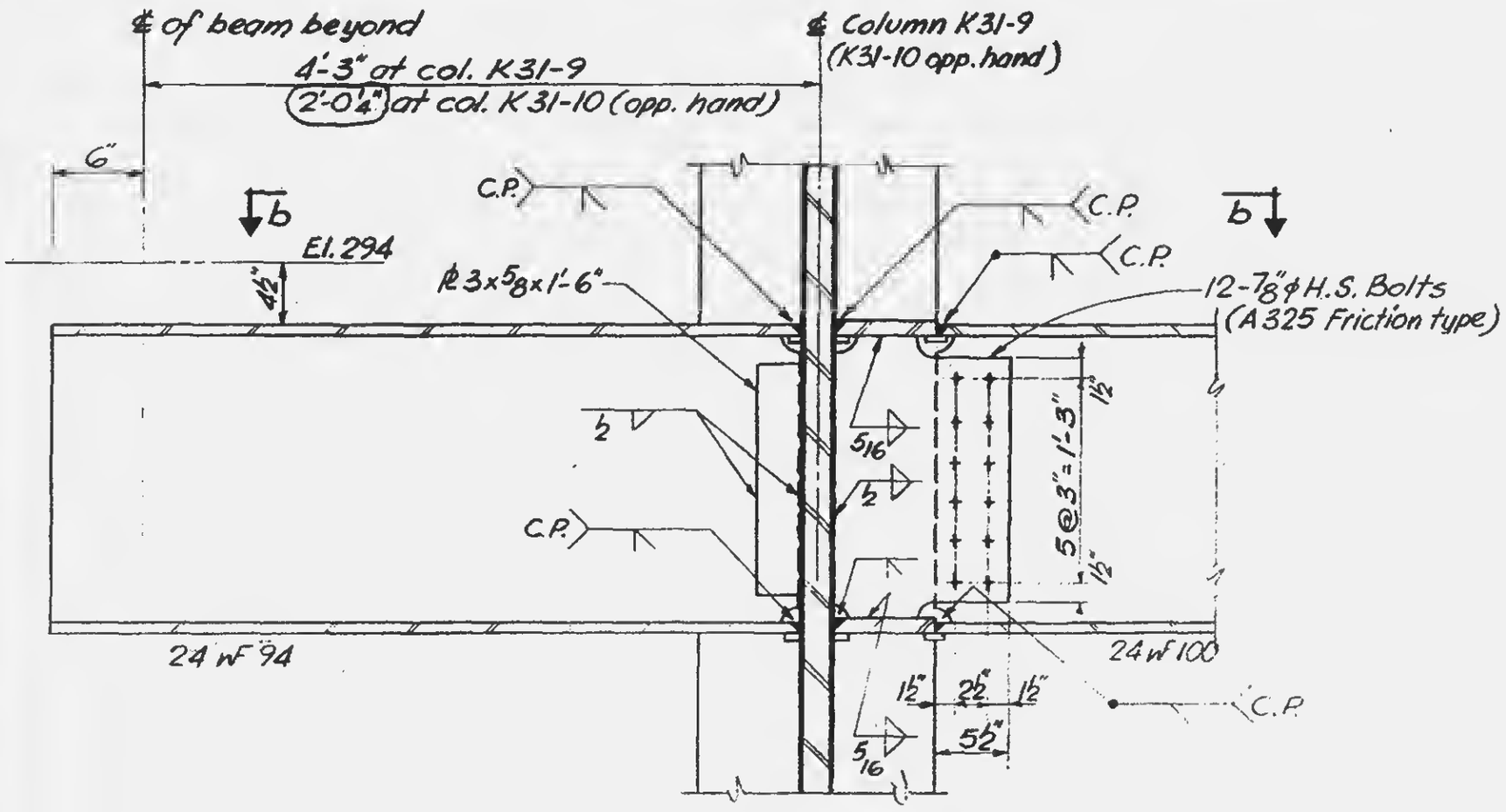
REVIEWED

12-JK1-56A

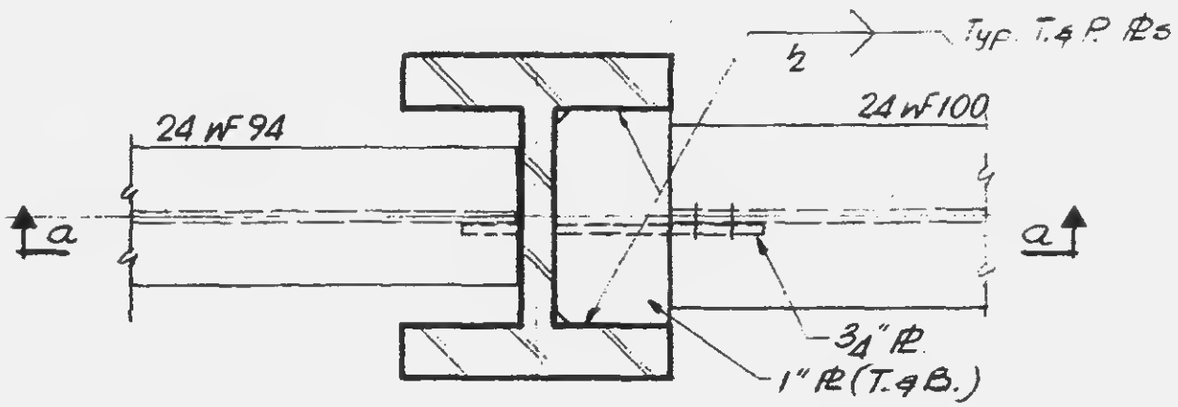
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PROJECT THE WORLD TRADE CENTER | TITLE CONNECTION DETAIL AT COLUMN K31-9 & K31-10 | DATE 11-24-67

REVISIONS
1-10-68



Section a-a



Section b-b

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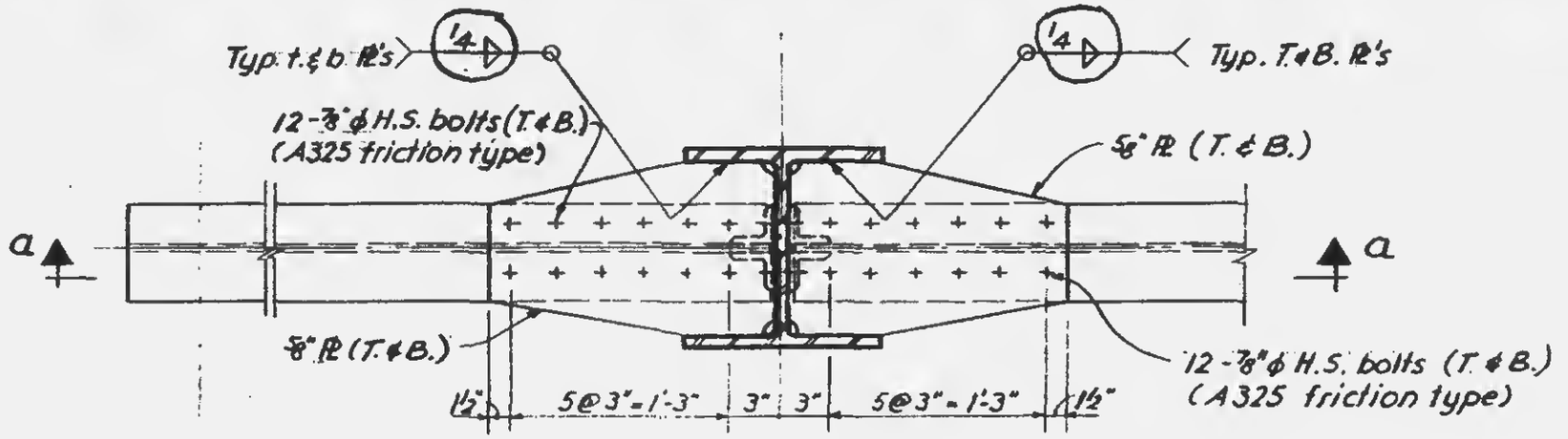
12-JK1-57

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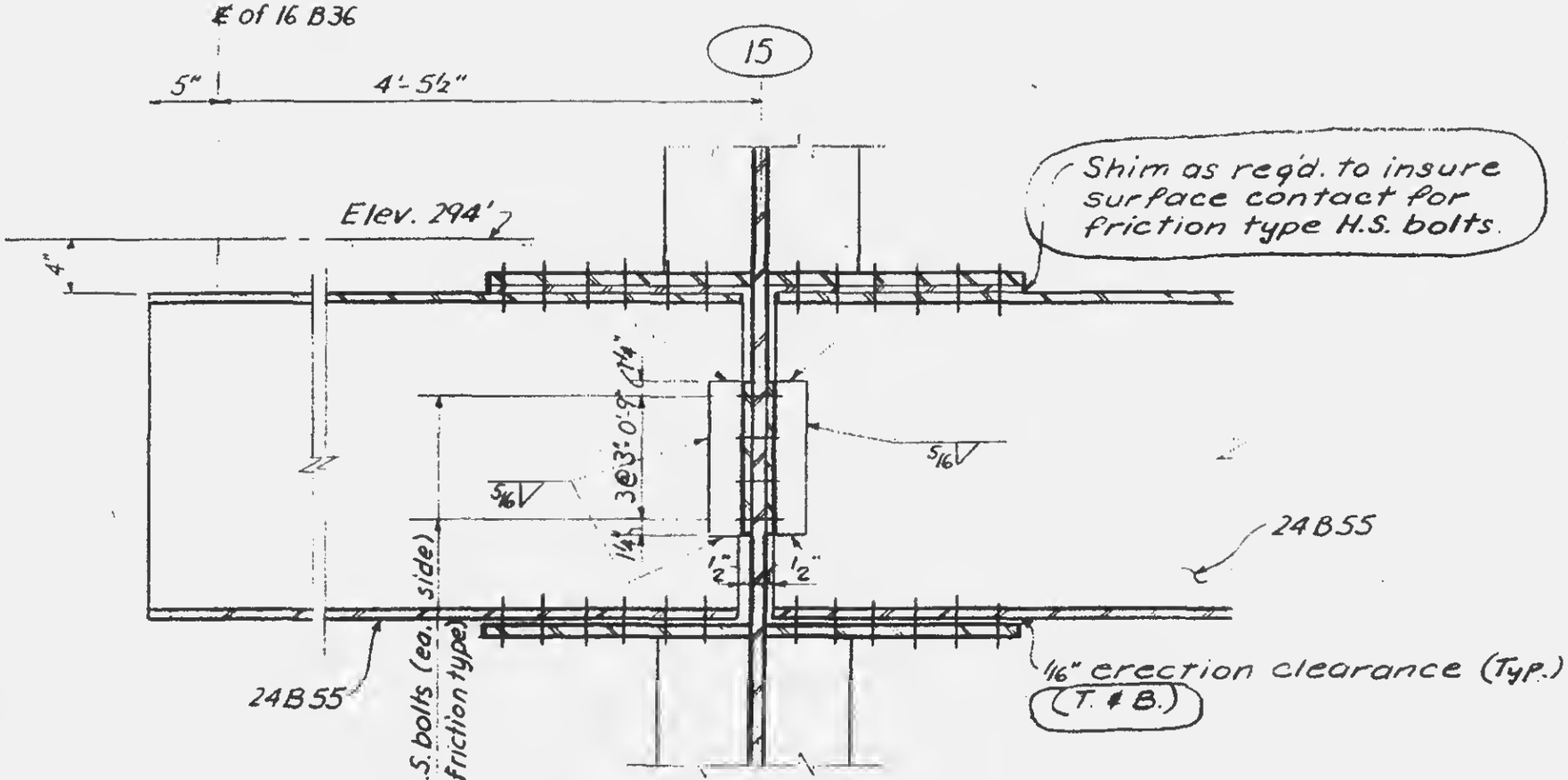
PROJECT: THE WORLD TRADE CENTER | TITLE: CONNECTION DETAIL AT COLUMN 315 + 5 | DATE: 11-24-67

REVISIONS

2-16-68



PLAN



Section a-a

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12-JK1-58

REVISIONS

2-9-68

4-5-68

9-4-68

12-3-68

4-18-69

DETAIL No.	ELEV. AT TOP OF BEAM		BEAM SIZES		SEAT		
	Upper beam	Lower beam	Upper beam	Lower beam	Size	Str. Adj. K	Weld b
A-1	309'-6"	307'-4"	18B40	36WF300	8WF35		
A-2	308'-5½"	307'-1"	14WF30	24WF76	Fill Plate only		
A-3	309'-4"	305'-1"	24WF76	36WF150	27WF84	3/8"	1/4"
A-4	309'-4"	305'-1"	36WF194	36WF194	14WF119	1/2"	1/4"
A-5	309'-4"	306'-4"	18B40	36WF194	18B40		
A-6	309'-4"	305'-1"	21B44	36WF194	30WF99		
A-7	309'-6"	305'-3"	21WF49	33WF130	30WF99		
A-8	309'-2"	305'-10"	18B35	36WF245	21WF73		
A-9	309'-3"	307'-0"	18WF55	27WF94	8WF58		
B-1	309'-6¼"	306'-1"	18B35	30WF99	24B55		
B-2	309'-3"	305'-5"	24B55	36WF260	21WF55		
B-3	309'-3"	305'-8"	24B55	36WF170	18WF55		

NOTE:
See 12-JK1-62 for detail.

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S.C.

REVIEWED
E.L.

12-JK1-59

PROJECT [illegible] TITLE [illegible] DATE 1-5-68

REVISIONS
3-21-69

DETAIL No.	ELEV. AT TOP OF BEAM		BEAM SIZES		SEAT			
	Upper beam	Lower beam	Upper beam	Lower beam	Size	Stiff. Pl. K	Weld a	Weld b
C-1	309'-6¼"		18 B 35					
		306'-9"	18 B 40	33 WF 240	14 WF 38			
D-1	309'-6"	307'-4"	21 WF 55	24 WF 68	ST 13 WF 42	¼	⅜	¼
D-2	306'-10"	305'-1"	18 WF 45	16½ x 29¼ I	ST 9 WF 25		5/16	
E-1	309'-3"	307'-0"	27 WF 94	24 WF 68		½	5/16	5/16

NOTE:
See 12-JK1-63 & 64 for detail.

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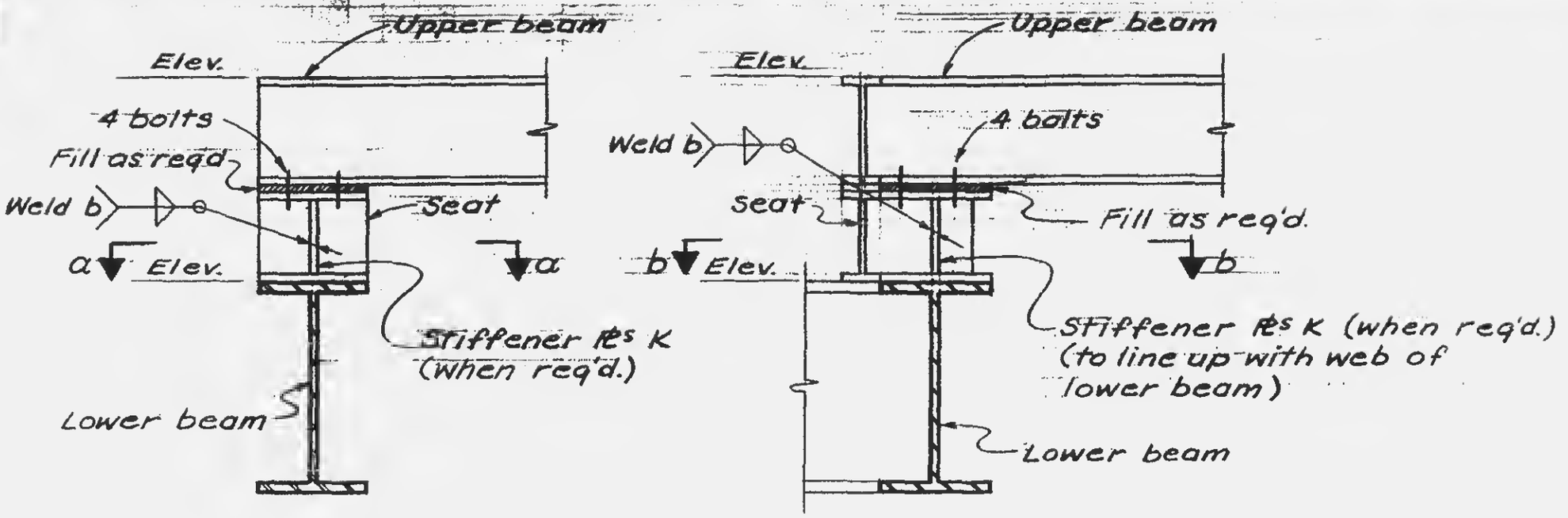
DRAWN
S.C.
REVIEWED
E.L.

12-JK1-60

REVISIONS

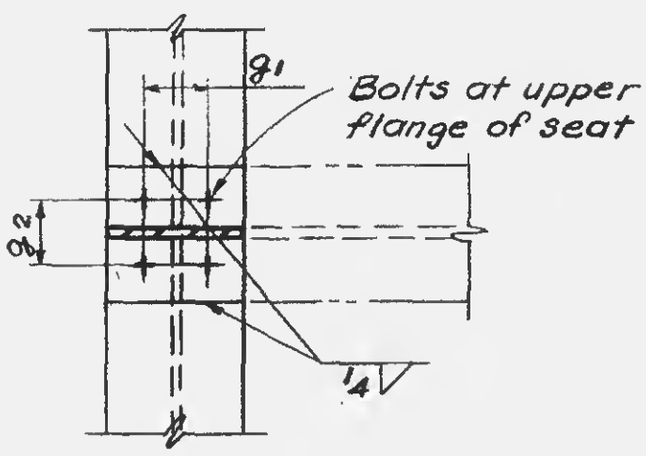
7-19-68

PROJECT [illegible] DATE 1-31-62



NOTES:

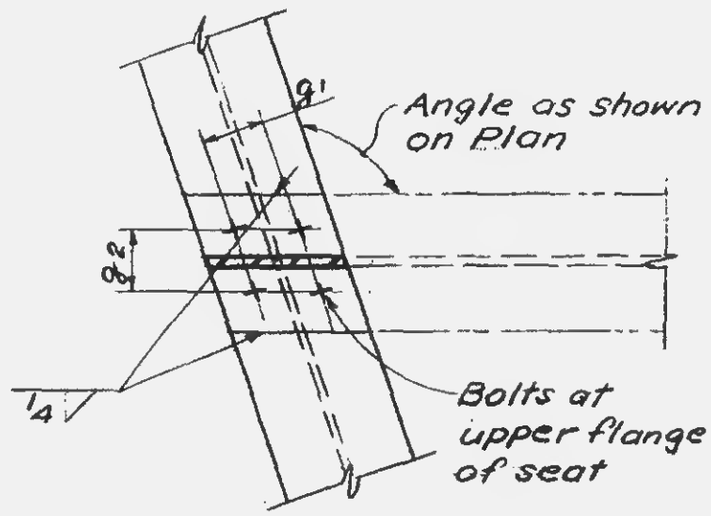
1. All seats to have Fy same as that of upper beam. (Stiff. Pl with Fy=42)
2. Length of all seats to be the same as flange width of lower beam.
3. g_1 to be g-value of lower beam. g_2 to be g-value of upper beam.
4. All bolts shown to be $\frac{7}{8}$" Φ H.S. bolts A325 friction type.
5. Where seat is not called out on schedule, use fill Pls only.



Section a-a

TYPE A SERIES

(see schedule on 12-JK1-59)



Section b-b

TYPE B SERIES

(see schedule on 12-JK1-59)

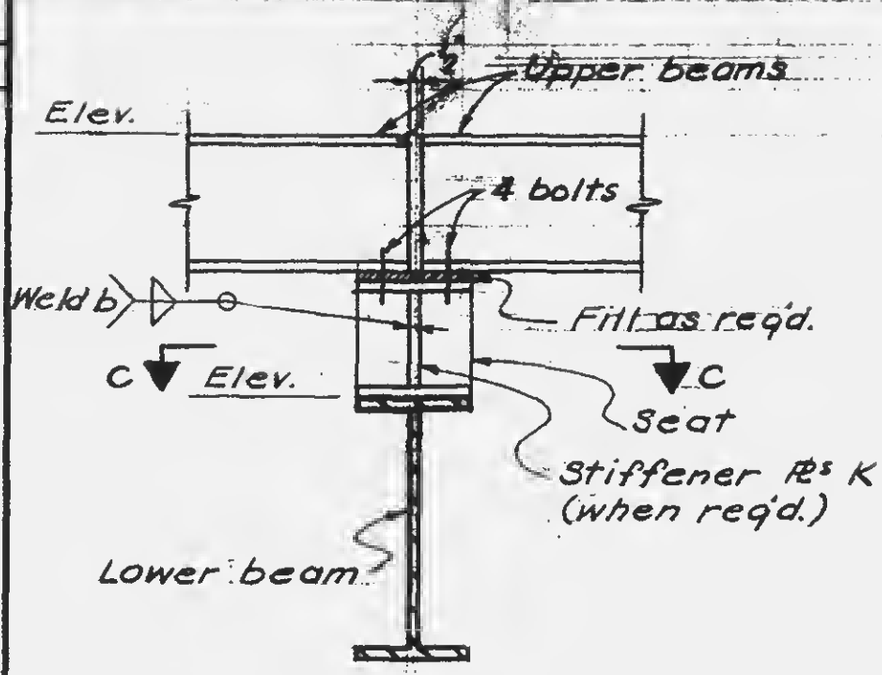
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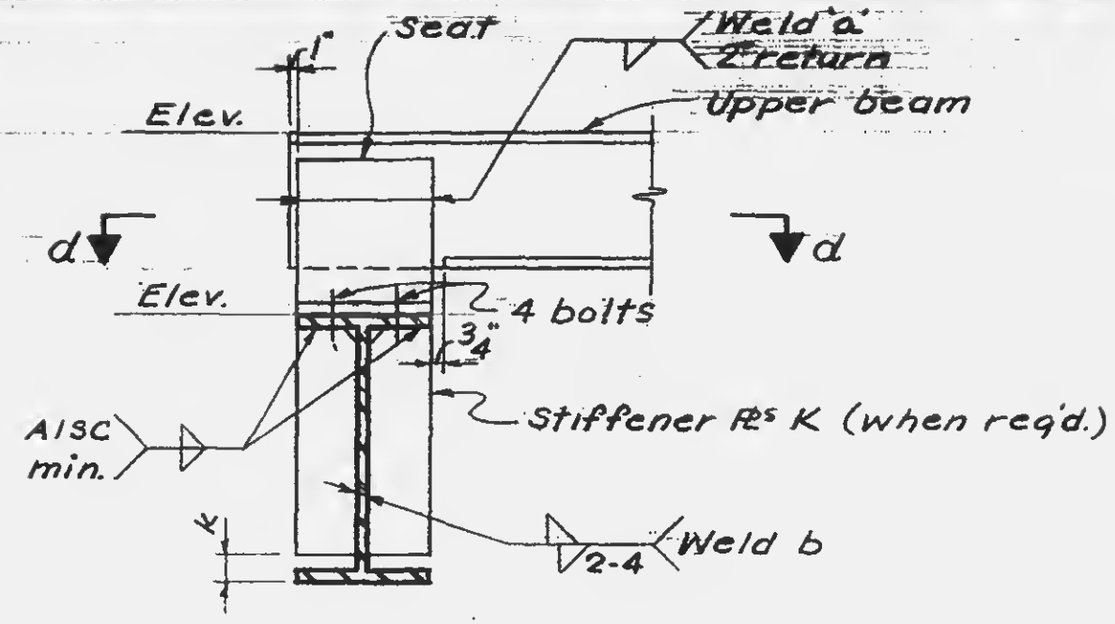
12-JK1-62

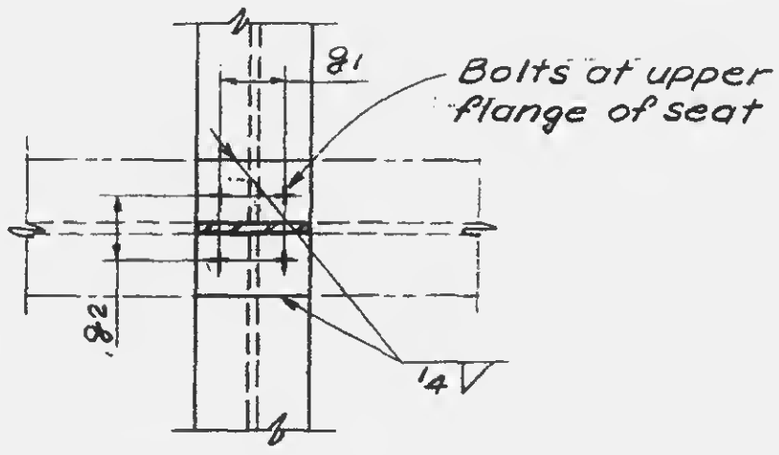
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PROJECT: [illegible] — M CONNECTION DETAILS — DATE: 1-5-68

REVISIONS
7-19-68



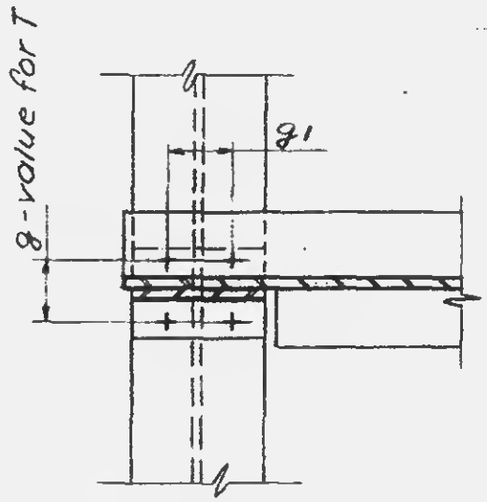




Section C-C

TYPE C SERIES

(see schedule on 12-JK1-60)



Section d-d

TYPE D SERIES

(see schedule on 12-JK1-60)

NOTES:

1. All seats to have Fy same as that of upper beam (Stiff. Rs with Fy=42)
2. Length of all seats to be the same as flange width of lower beam.
3. g_1 to be g-value of lower beam. g_2 to be g-value of upper beam.
4. All bolts shown to be 7/8"Φ H.S. bolts A325 friction type.
5. Where seat is not called out on schedule, use fill Rs only.

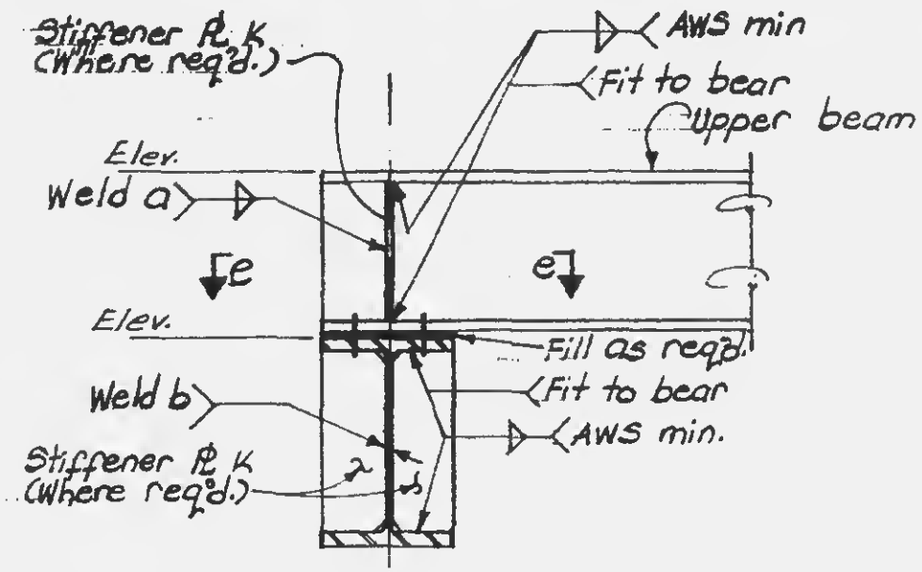
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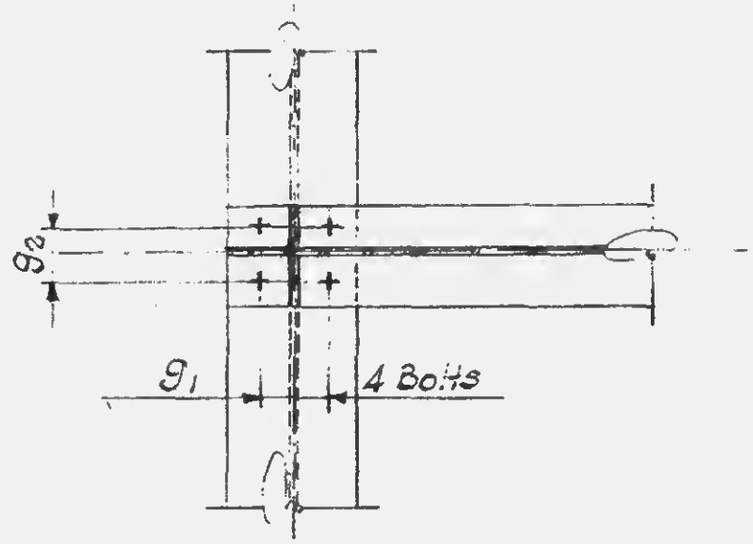
12-JK1-63

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PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAILS | DATE 3-21-69

REVISIONS





Section e-e
TYPE 'E' SERIES
(See schedule on 12JK1-60)

Notes:
1. All seats to have Fy same as that of upper beam. (Stiffener ② with Fy=42)
2. Length of all seats to be the same as flange width of lower beam.
3. 'g1' to be 'g' value of lower beam. 'g2' to be 'g' value of upper beam.
4. All bolts shown to be 7/8" ϕ H.S. bolts A325 friction type.
5. Where seat is not called out on schedule, use fill PLs only.

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DRAWN S.T.M.

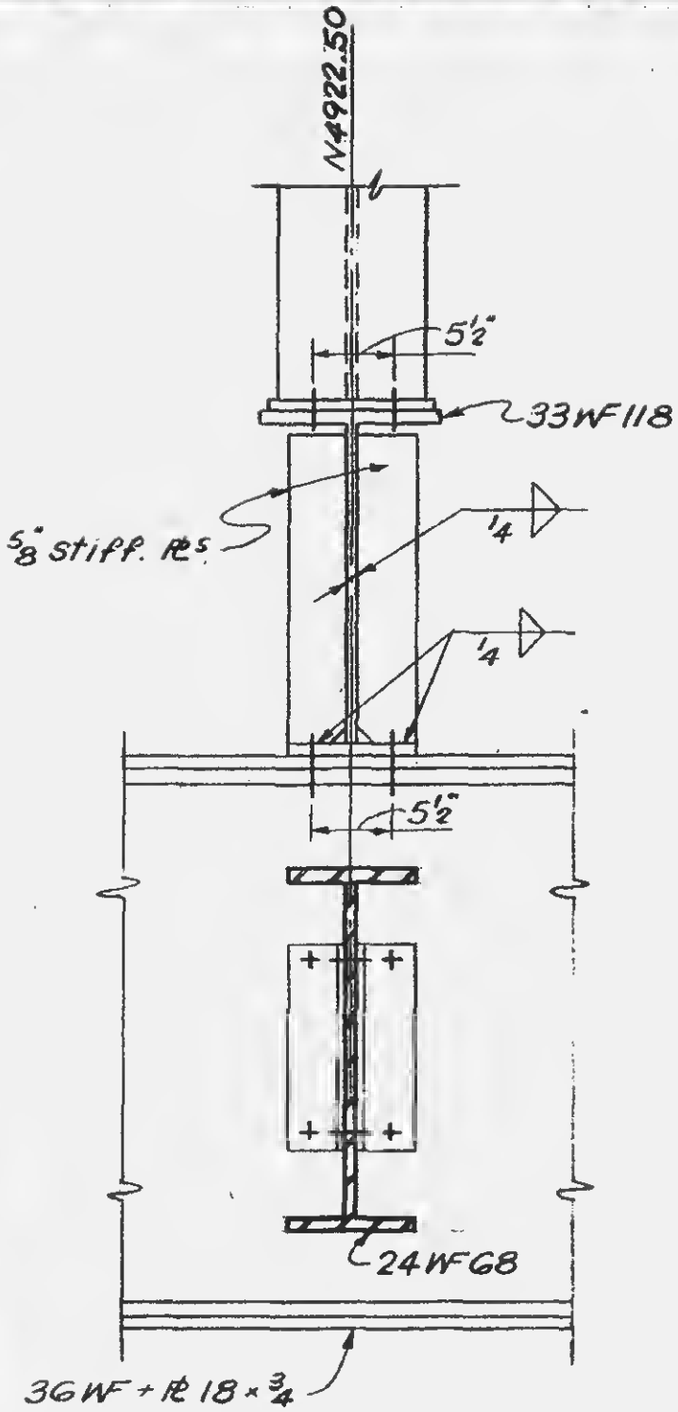
REVIEWED E.L.

12-JK1-64

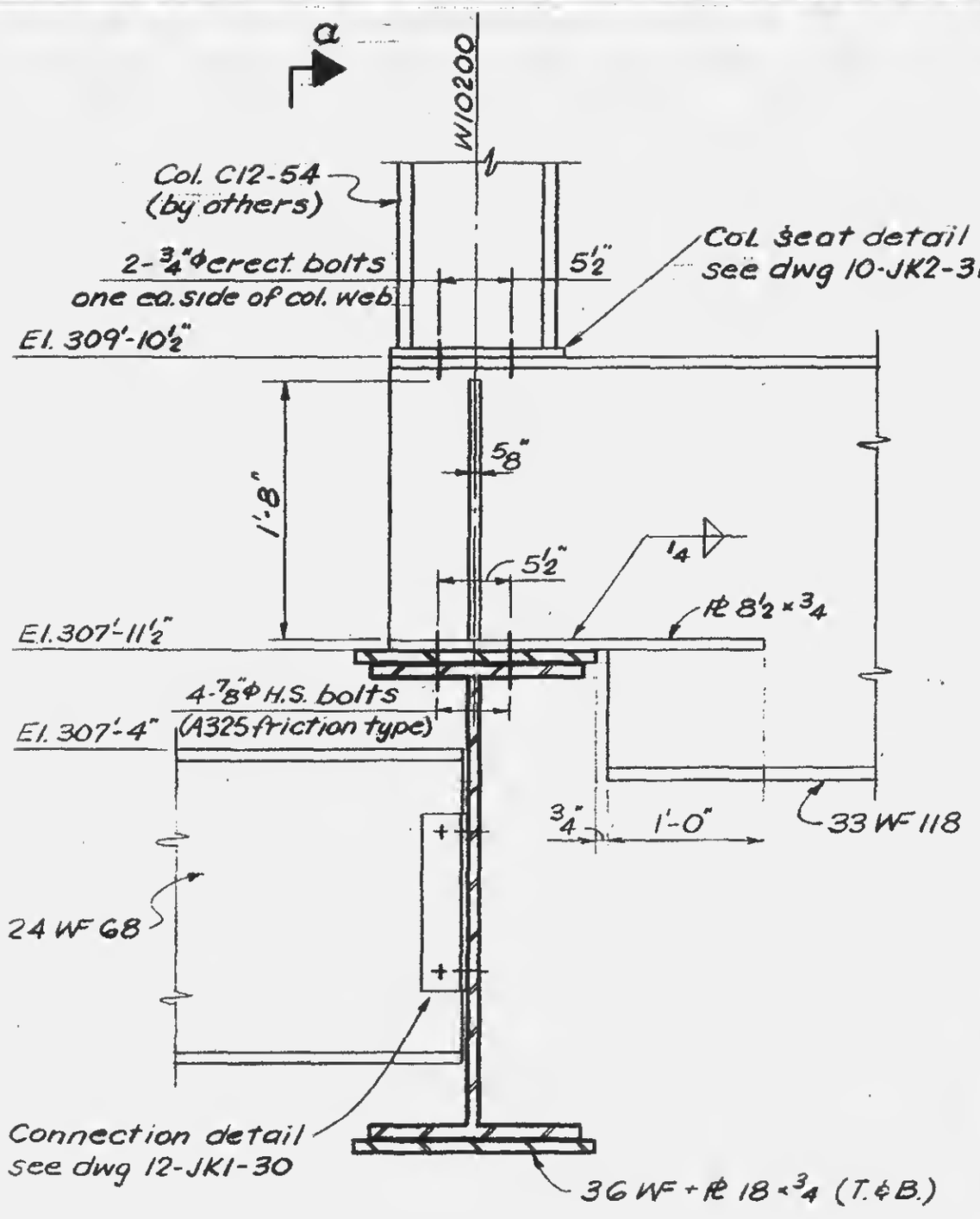
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PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAILS | DATE 1-8-68

REVISIONS



Section a-a



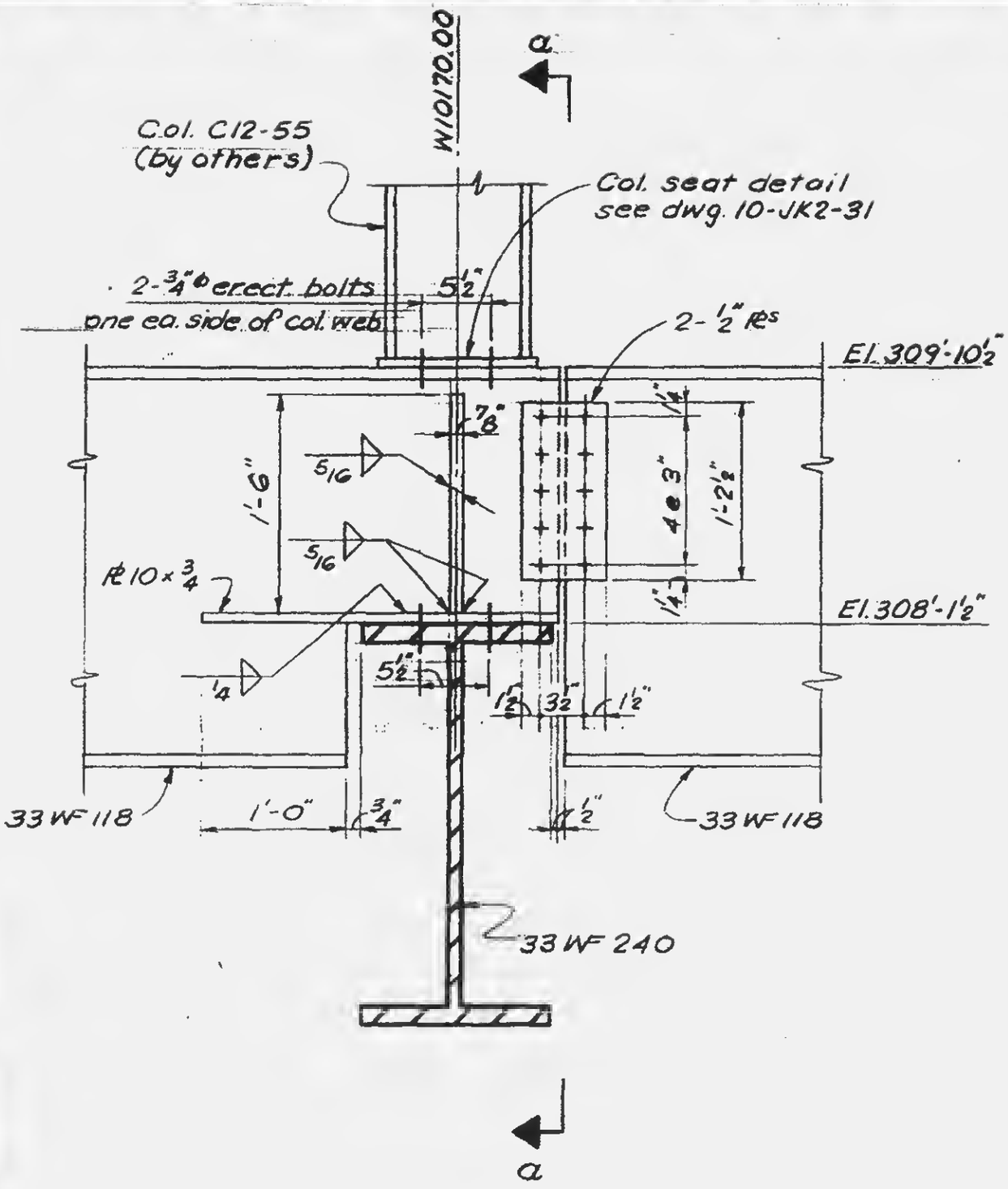
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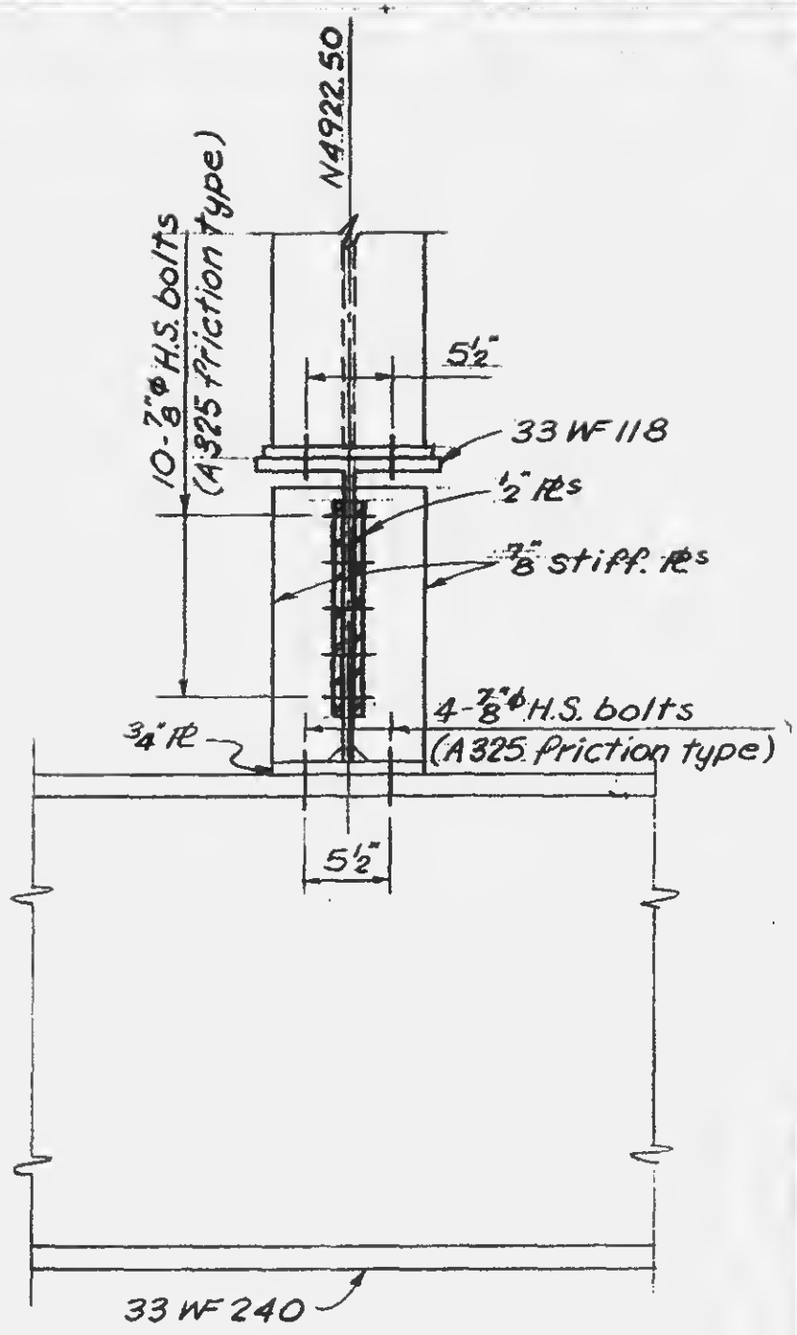
12-JK1-65

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PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAILS | DATE 1-5-66

REVISIONS





Section a-a

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12-JK1-66

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM TO COL. CONN. - WHERE COL. SPLICE 3' ABOVE FLOOR | DATE: 1-29-68

REVISIONS
3-19-68
11-11-68
4-18-69
5-29-69

SCHEDULE

DETAIL NO.	COLUMN SIZE	BEAM SIZE	CONNECTION TYPE	CONNECTION LENGTH	NO. OF BOLTS 1ST ROW	NO. OF BOLTS 2ND ROW	WELD A
11	14 WF 426	21 WF 55	A	1'- 2½"	5	2	½
12	14 WF 398	21 WF 55	A	1'- 2½"	5	2	½
13	14 WF 398	36 WF 135	A	1'- 8½"	7	4	½
14	14 WF 150	21 WF 55	B	1'- 2½"	5	2	5/16
15	14 WF 211	21 WF 55	B	1'- 2½"	5	2	3/8
16	14 WF 426	36 WF 160	A	2'- 2½"	9	5	½
17	14 WF 426	33 WF 130	A	2'- 5½"	10	5	½
18	14 WF 398	33 WF 130	A	2'- 5½"	10	5	½
19	14 WF 398	30 WF 108	A	1'- 8½"	7	0	½
20	14 WF 398	24 B 55	A	0'- 11½"	4	2	½
21	14 WF 176	24 B 55	B	0'- 11½"	4	2	5/16
22	14 WF 184	24 B 55	B	0'- 11½"	4	2	5/16
23	14 WF 167	30 WF 116	A	1'- 5½"	6	2	5/16
24	14 WF 237	33 WF 141	B	0'- 11½"	4	0	3/8
* 25	14 WF 500	18 WF 50	A	1'- 2½"	5	0	½
* 26	14 WF 730	18 WF 45	A	0'- 11½"	4	0	½
* 27	14 WF 730	21 WF 55	A	1'- 5½"	6	0	½
* 28	14 WF 314	24 WF 68	A	1'- 5½"	6	0	½
* 29	14 WF 320 + PL's	16 B 26	A	1'- 2½"	5	3	½
* 30	14 WF 320 + PL's	14 B 22	A	0'- 11½"	4	3	½
* 31	14 WF 320 + PL's	21 B 44	A	1'- 5½"	6	4	½
* 32	14 WF 605	27 WF 84	A	1'- 8½"	7	2	½
* 33	14 WF 320 + PL's	33 WF 118	A	1'- 8½"	7	5	½
* 34	14 WF 550	24 WF 76	A	1'- 5½"	6	2	½
* 35	14 WF 550	36 WF 150	A	1'- 8½"	7	7	½
* 36	14 WF 287	36 WF 150	A	1'- 8½"	7	7	3/8
* 37	14 WF 320 + PL's	33 WF 220	A	1'- 11½"	** 8	** 6	½
* 38	14 WF 320 + PL's	30 WF 132	A	1'- 11½"	** 8	** 2	½
* 39	14 WF 500	30 WF 190	A	1'- 11½"	** 8	** 4	½

Notes:
1. See 12-JK1-68 for connection details.
2. * — beam at elevation other than El. 310 as shown on 12-JK1-68.
3. ** — use 1" ϕ H.S. bolts (A-490 friction type)

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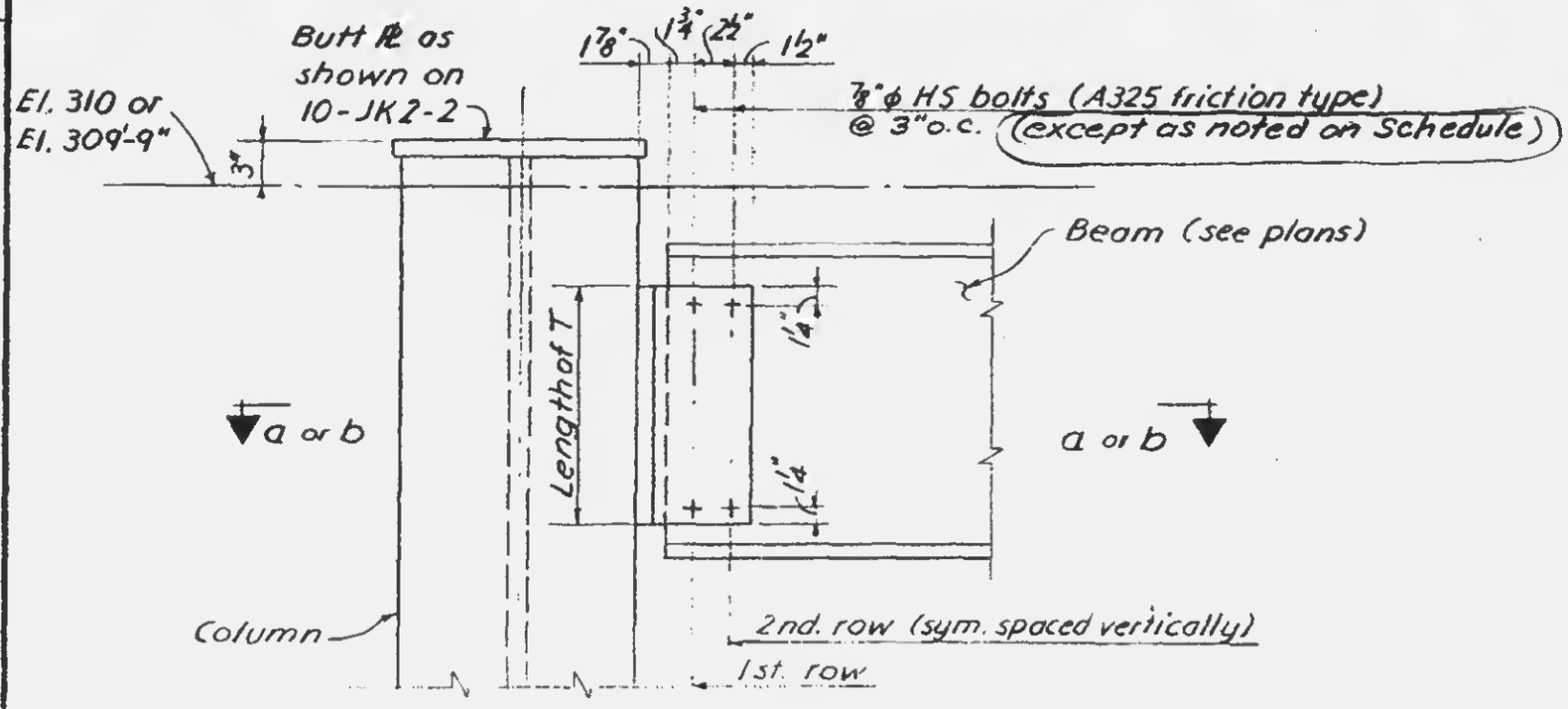
DRAWN S.C.
REVIEWED E.L.

12-JK1-67

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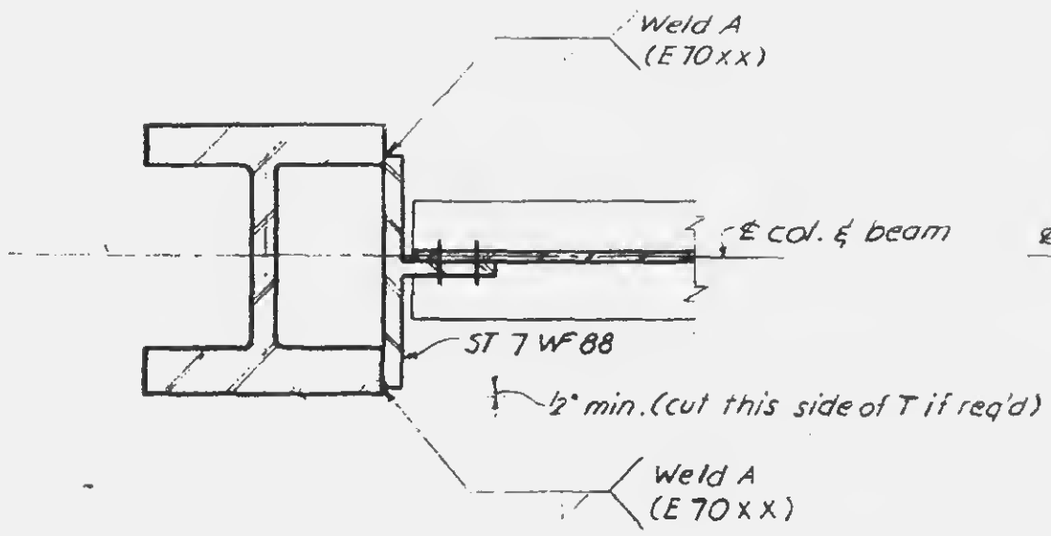
PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM TO COLUMN CONN. - WHERE COL. SPLICE 3" ABOVE FL. | DATE: 1-29-68

REVISIONS
5-29-69

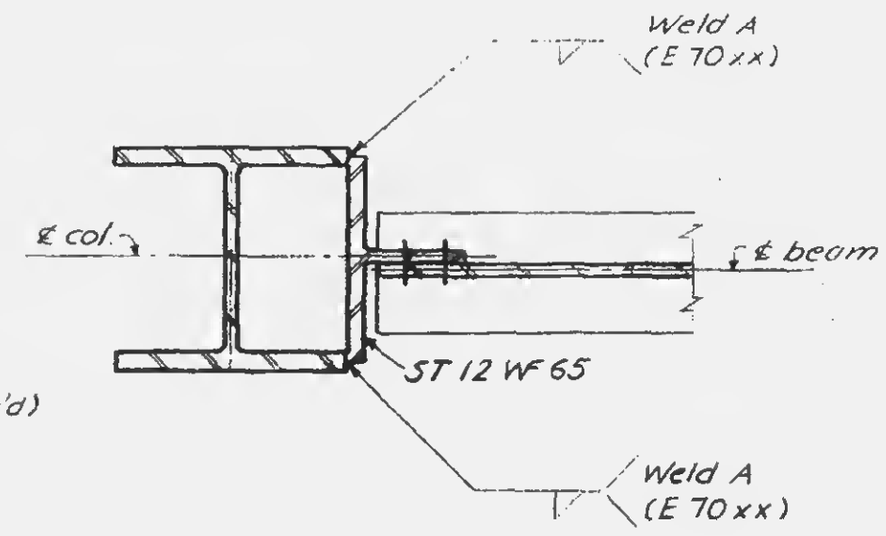


Weld A:
5/16" weld
⅜" weld for col. Fl. over 1½" to 24".
½" weld for col. Fl. over 2¼" to 6"
Provide full return at top.

Note:
1. Material of T to be A-36
2. See schedule on 12-JK1-67 for length of T & no. of bolts.



(Type A)
Section a-a



(Type B)
Section b-b

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S.C.

REVIEWED
E.L.

12-JK1-68

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF ELEVATOR SEPARATOR BEAMS | DATE: 2-9-68

REVISIONS
6-7-68
6-28-68
2-19-69

ELEVATOR NO	LOCATION OF BEAMS	ELEVATION AT TOP OF BM	LENGTH OF BEAMS	END CONN. DETAILS LEFT	END CONN. DETAILS RIGHT
J-1,2 & 3	EAST OF J-1	323'-6"	9'-7"	A	A
		319'-6"	9'-4½"		
		309'-8"	9'-7"		
		303'-6"			
		293'-8"			
		284'-2"			
		274'-2"			
		264'-2"			
		262'-6"			
		252'-8"	9'-7"		A
		251'-6"	9'-6"	A	B
		241'-8"	8'-6"	*	*
	WEST OF J-2 WEST OF J-3	323'-6"	9'-7"	A	A
		319'-6"	9'-4½"		
		309'-8"	9'-7"		
		303'-6"			
		293'-8"			
		284'-2"			
		274'-2"			
		264'-2"			
		252'-8"	9'-7"	A	A
		241'-8"	8'-10"	*	*

NOTE:-

1. * No seat Pl. Req'd. Beam end embedded in pocket formed in foundation wall.
2. See Dwg. 12-JK1-70 for type and detail of connection.

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2-[illegible]-69

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF ELEVATOR SEPARATOR BEAMS | DATE: 5-26-69

REVISIONS
3-30-70
5-18-70

Elevator No.	Location of beams	Elevation at top of beam	BEAM Size	BEAM Length	END CONN. DETAILS Left	END CONN. DETAILS Right
J-4	North of J-4	321'-7"	6×4×⅜ □	9'-3"	A	A
		315'-4"				
		309'-1"				
		302'-10"				
		296'-7"				A
		290'-4"				A**
		287'-8"		9'-3"	A	C
C-9		309'-10"		8'-10"	C	A
		301'-10"		9'-3½"	A	
		293'-10"		8'-10"		
K-1	North of K-1	321'-7"		9'-3"		
		315'-4"		9'-3"		A
		309'-1"		9'-0"		***
		302'-10"		9'-3"		A
		296'-7"		9'-3"		A
		290'-4"		9'-0"		***
		287'-8"		9'-0"		***
K-2	West of K-2	303'-0"	6×4×⅜ □	8'-2½"		A
		293'-8"	12B19 (Fy=42)	8'-0½"		
		280'-8"	6×4×⅜ □			
		267'-8"				
		256'-8"				
		252'-0"				
		241'-0"	6×4×⅜ □	8'-0½"	A	A

Elevator No.	Location of beams	Elevation at top of beam	BEAM Size	BEAM Length	END CONN. DETAILS Left	END CONN. DETAILS Right
K-3, 4 & 5	South of K-3 South of K-4	323'-6"	6×4×⅜ □	9'-7"	A	A
		319'-6"		9'-4½"		
		309'-8"		9'-7"		
		303'-6"				
		293'-8"				
		284'-2"				
		274'-2"				
		264'-2"				
		252'-8"		9'-7"	A	A
	South of K-3	241'-8"		8'-10"	*	A**
	North of K-5	323'-6"		9'-7"	A	A
		319'-6"		9'-4½"		
		309'-8"		9'-7"		
		303'-6"				
		293'-8"				
		284'-2"				
		274'-2"				
		264'-2"				
		262'-6"				
		252'-8"		9'-7"	A	
		251'-6"		9'-5"	B	A
	South of K-4 North of K-5	241'-8"		8'-0"	*	A**
H-1, 2 & 3	Btw. H-1 & H-2 Btw. H-2 & H-3	321'-2"		9'-3½"	A	A
		307'-2"				
H-4, 5 & 6	Btw. H-4 & H-5 Btw. H-5 & H-6	321'-2"				
		307'-2"		9'-3½"		
H-7, 8 & 9	East of H-7 West of H-8 West of H-9 East of H-9	321'-2"		11'-5"		
		307'-2"		11'-5"		
		293'-2"		11'-5"		
H-10		321'-2"		10'-9"		
		307'-2"		10'-9"		
		293'-2"	C×4×⅜ □	10'-9"	A	A

NOTES:

1. * — no seat Pl & anchor req'd. Beam end embedded in pocket formed in foundation wall.
2. A** — indicates End Conn. Detail similar to Type A, except no seat Pl & anchor req'd.
3. See Dwgs 12-JK1-70 & 70A for type & detail of connection.
4. *** — Similar to Type A, with 7" embedment in concrete and base Pl = 4"×⅝"×0'-6" long.

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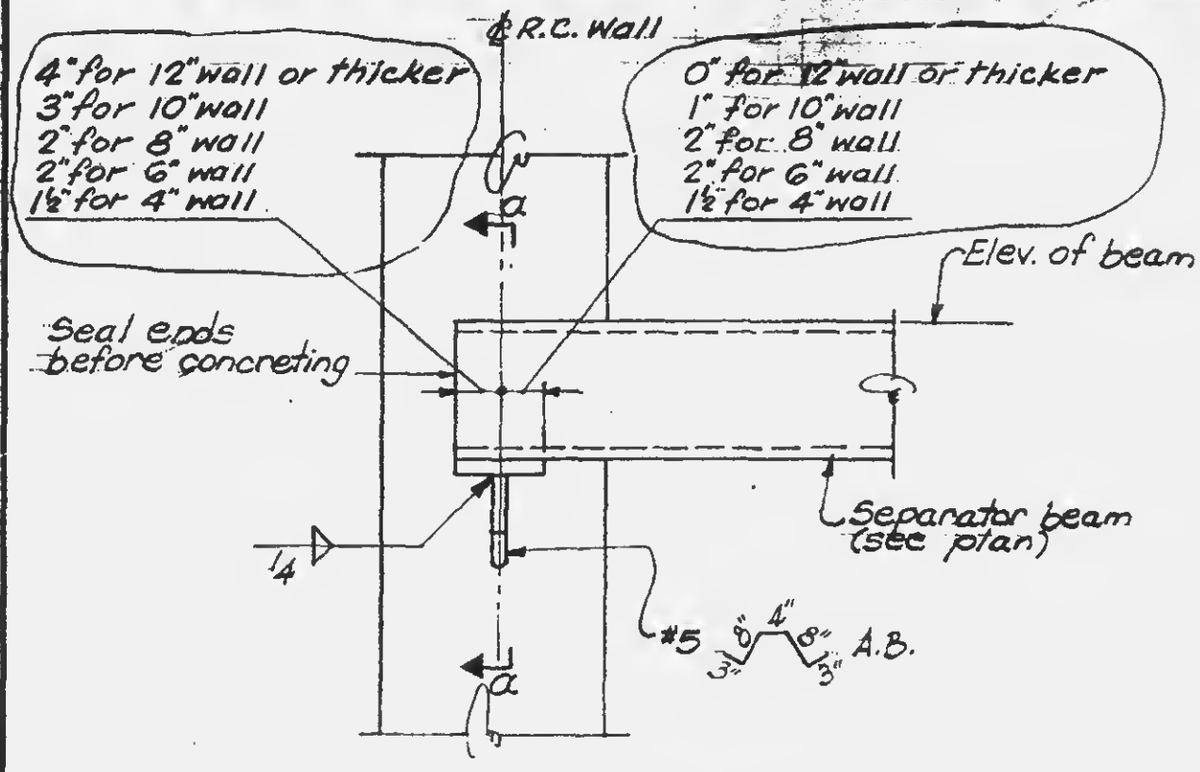
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12-JK1-69A

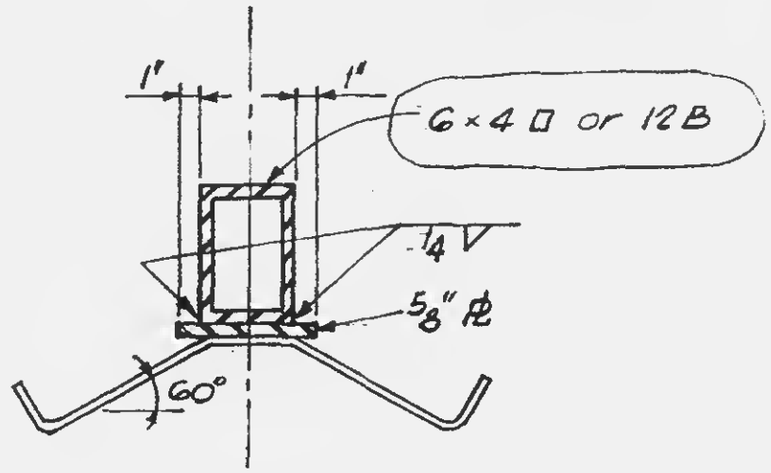
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PROJECT THE WORLD TRADE CENTER | TITLE [illegible] SEPARATOR BEAMS | DATE 2-9-68

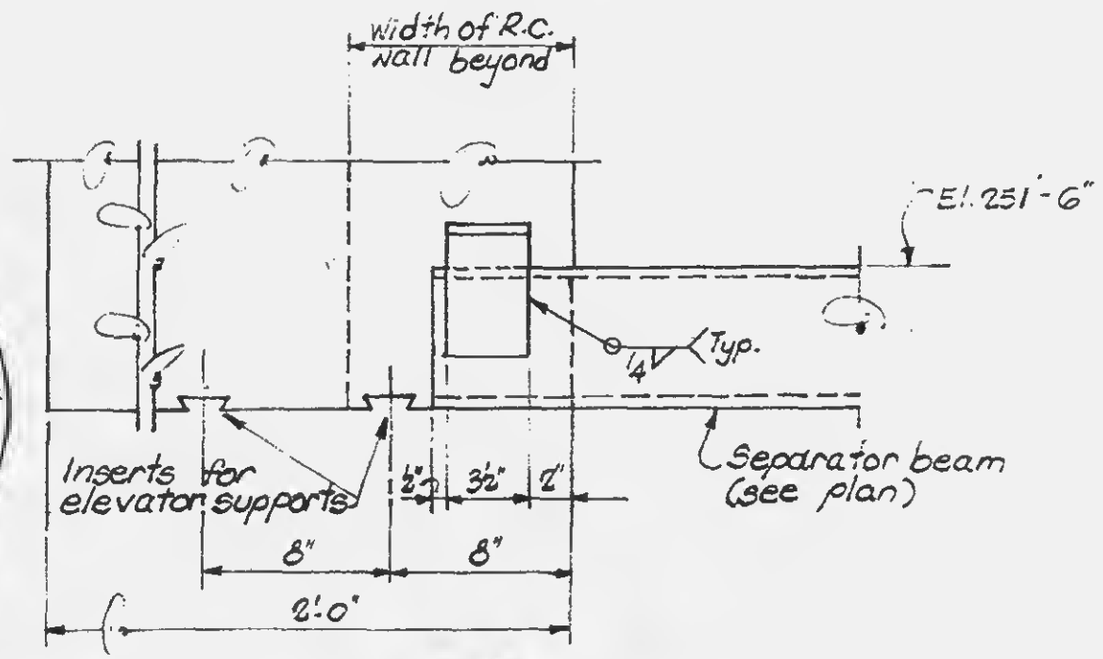
REVISIONS
6-7-68
6-28-68
2-19-69
5-26-69



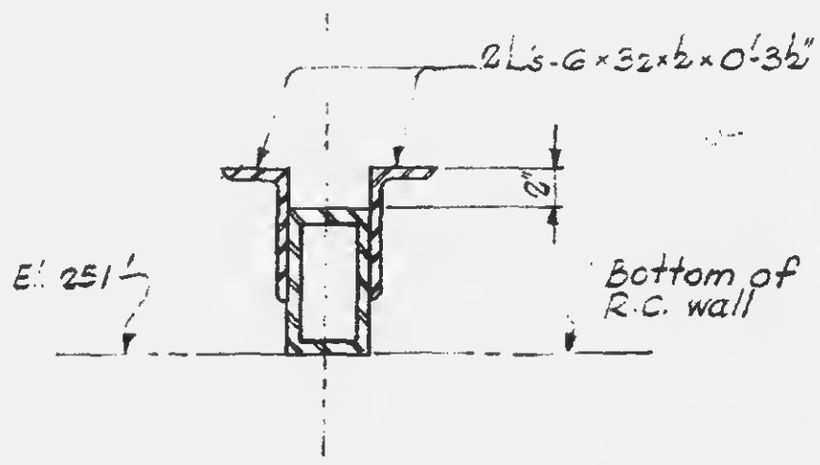
Type A



Section a-a



Type B



Section b-b

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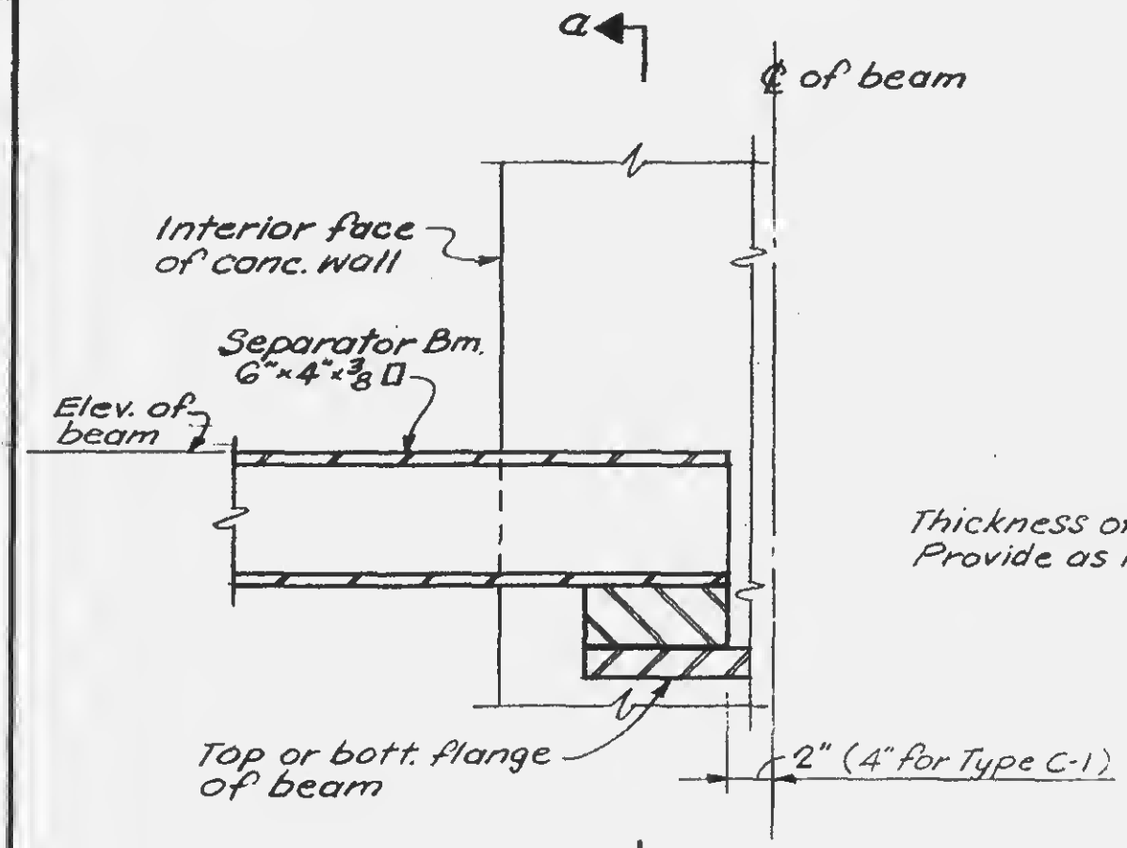
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REVIEWED E.L.

12-JK1-70

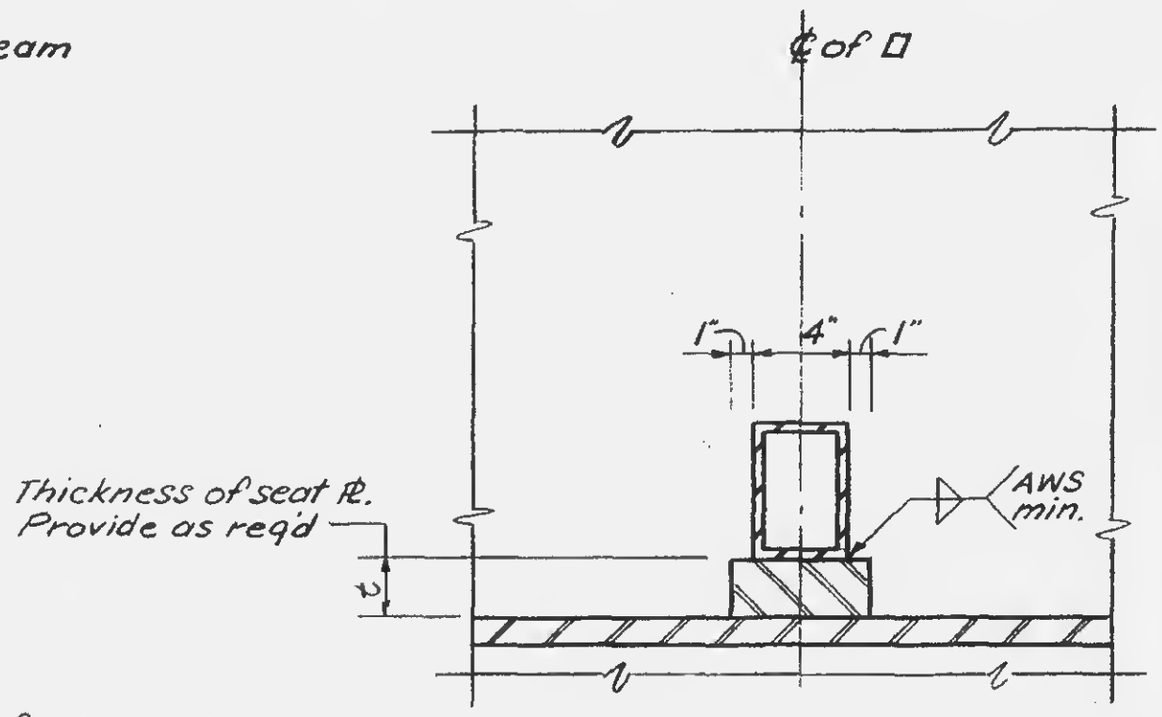
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PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF ELEVATOR SEPARATOR BEAMS | DATE 5-26-69

REVISIONS



Type C



Section a-a

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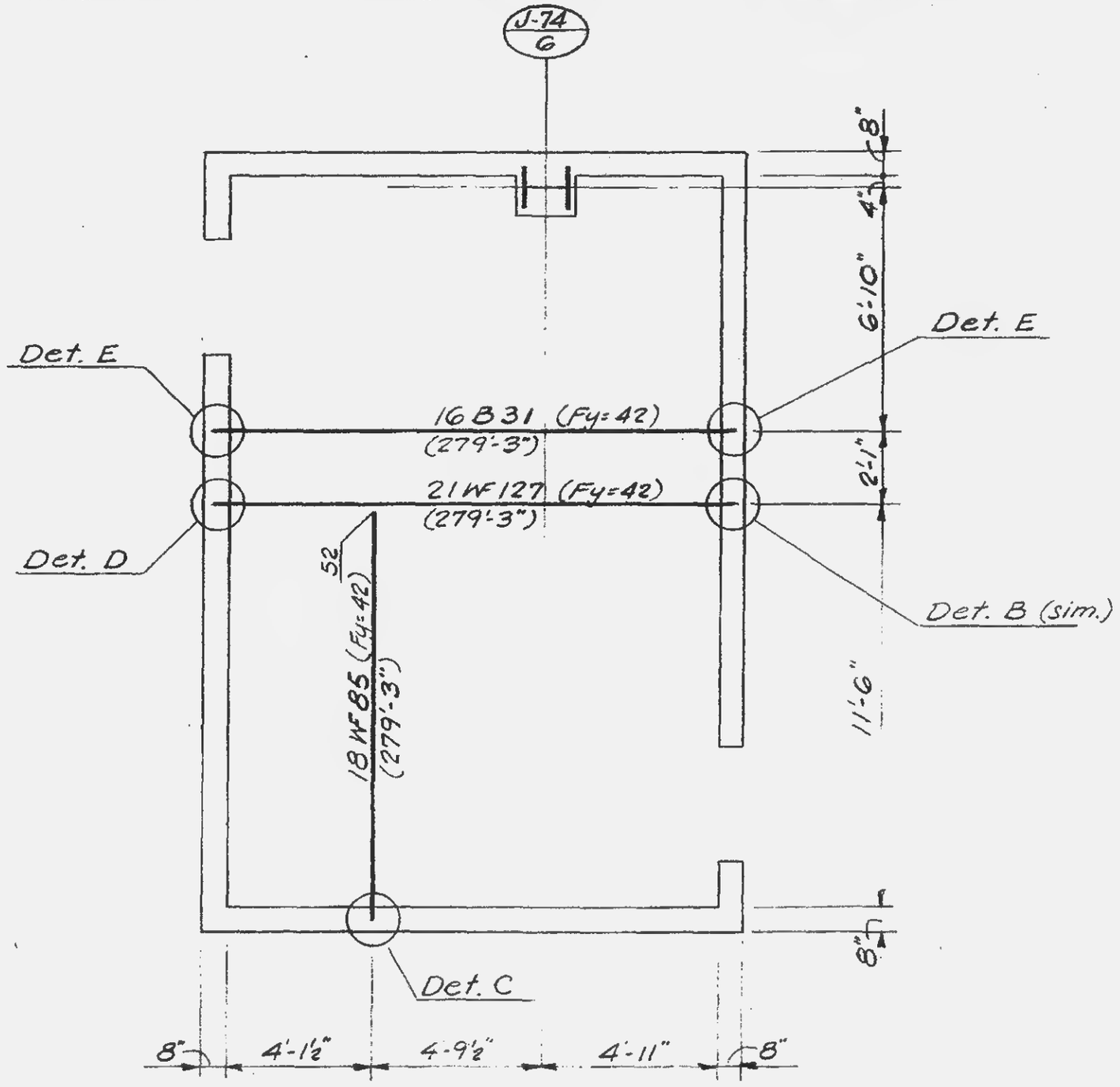
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12-JK1-70A

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PROJECT: THE WORLD TRADE CENTER | TITLE: ELEVATOR J-4 "BUMPER" BEAMS | DATE: 5-26-69

REVISIONS



Plan

Note:
For details see 12-JK1-70F

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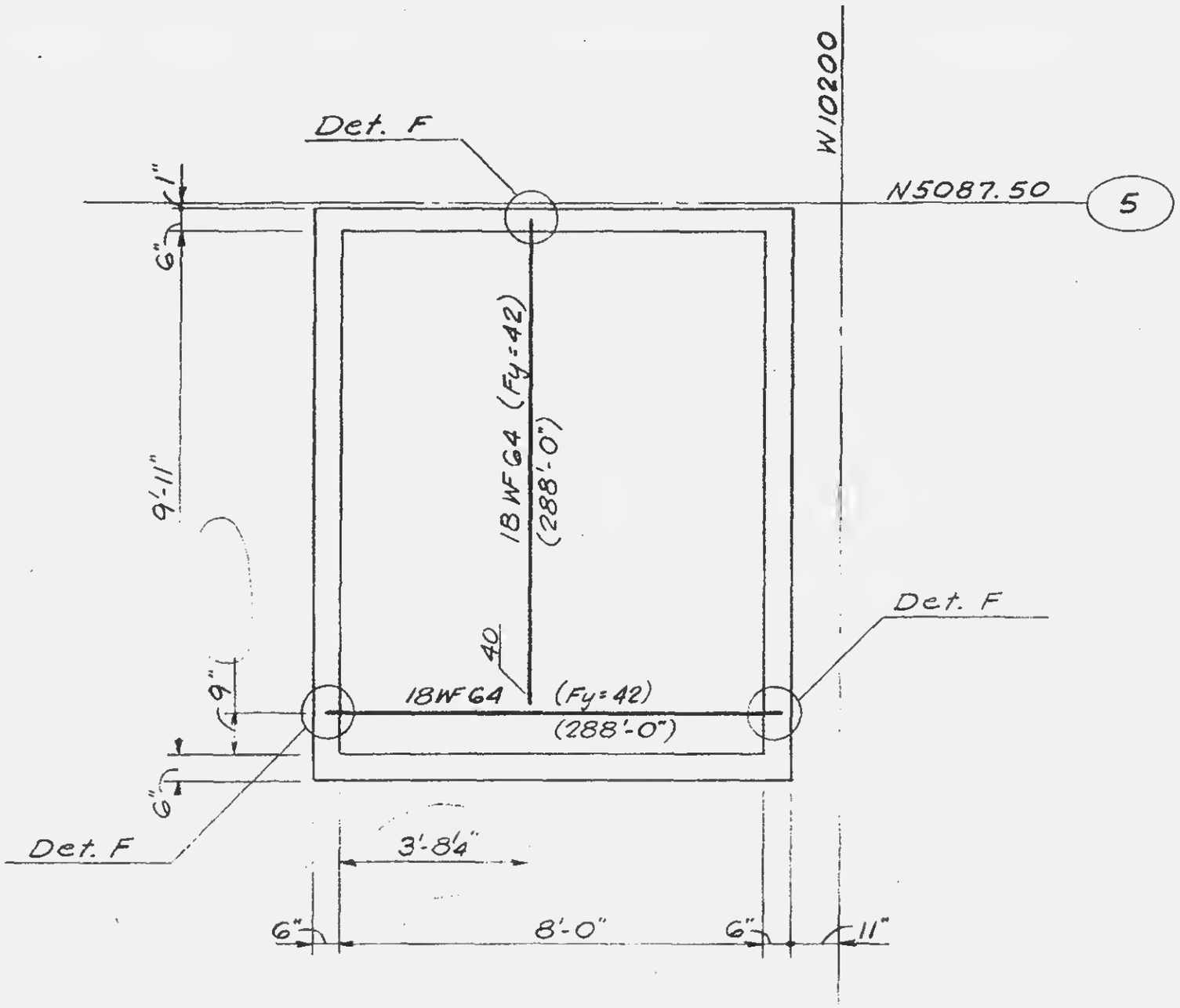
12-JK1-70B

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PROJECT: THE WORLD TRADE CENTER | TITLE: ELEVATOR C-9 "BUMPER" BEAMS | DATE: 5-26-69

REVISIONS

10-13-69



Plan

Note:
For details see 12-JK1-70F

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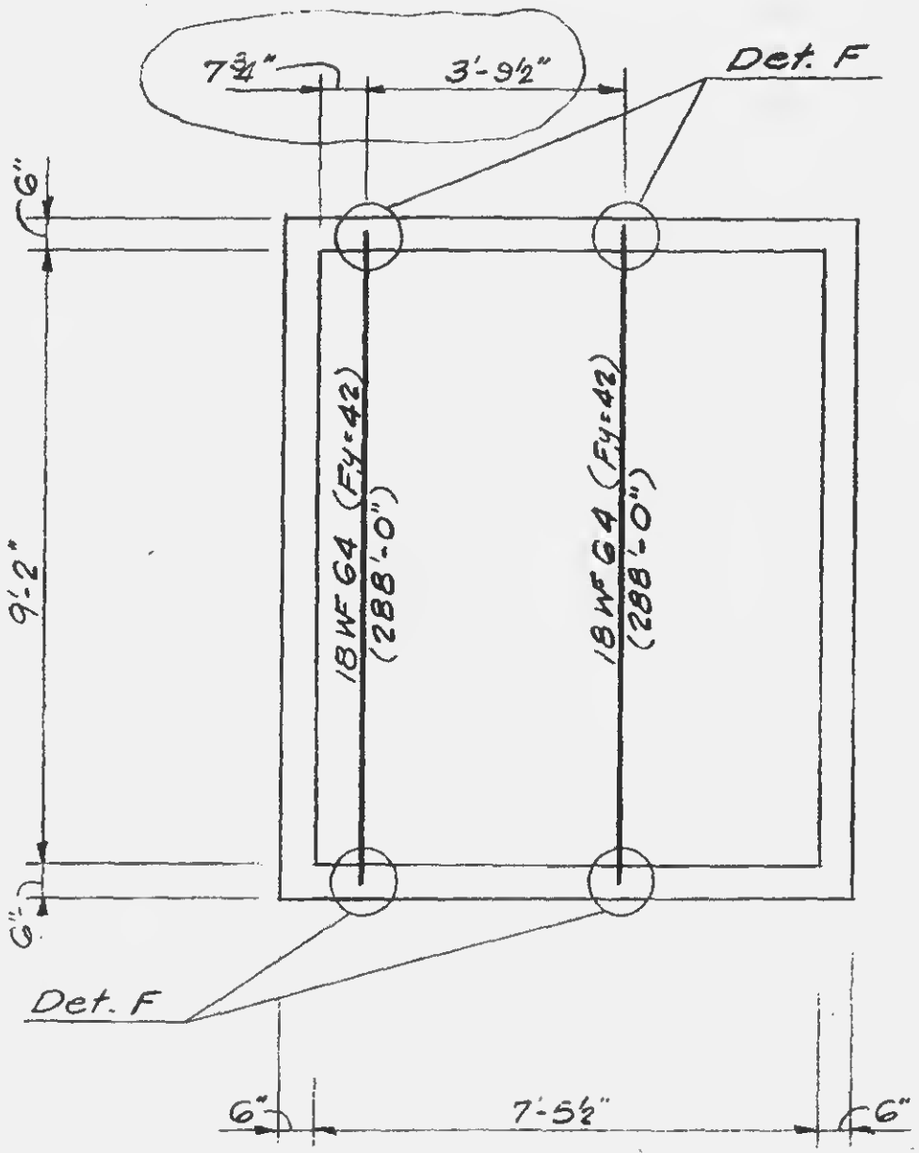
12-JK1-70C

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PROJECT: THE WORLD TRADE CENTER | TITLE: ELEVATOR C-10 "BUMPER" BEAMS | DATE: 5-26-69

REVISIONS

10-13-69



Plan

Note:
For details see 12-JK1-70F

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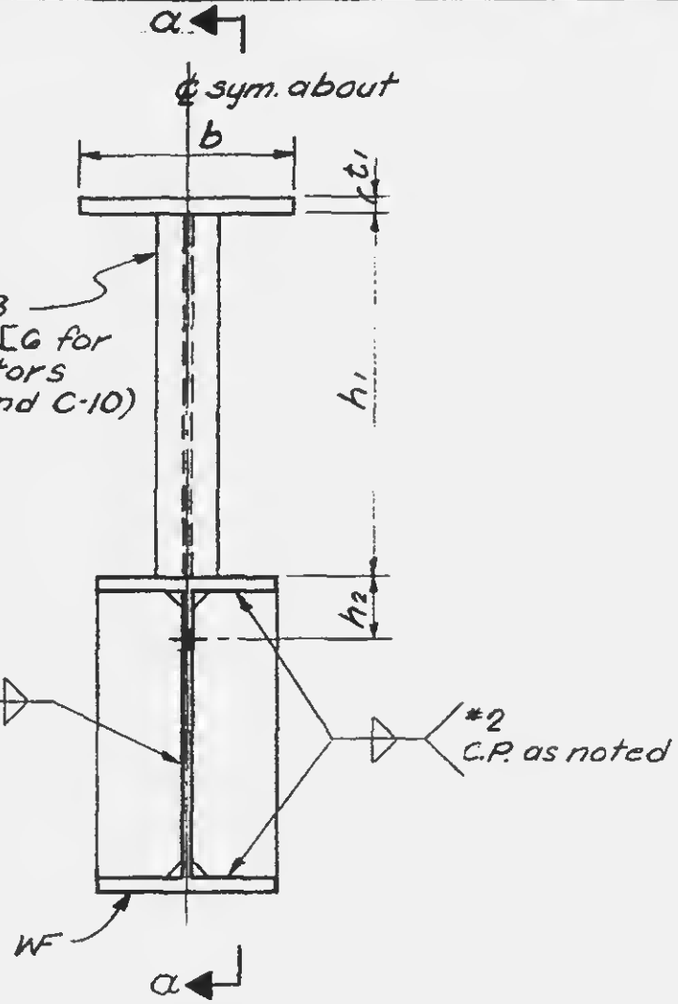
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12-JK1-70D

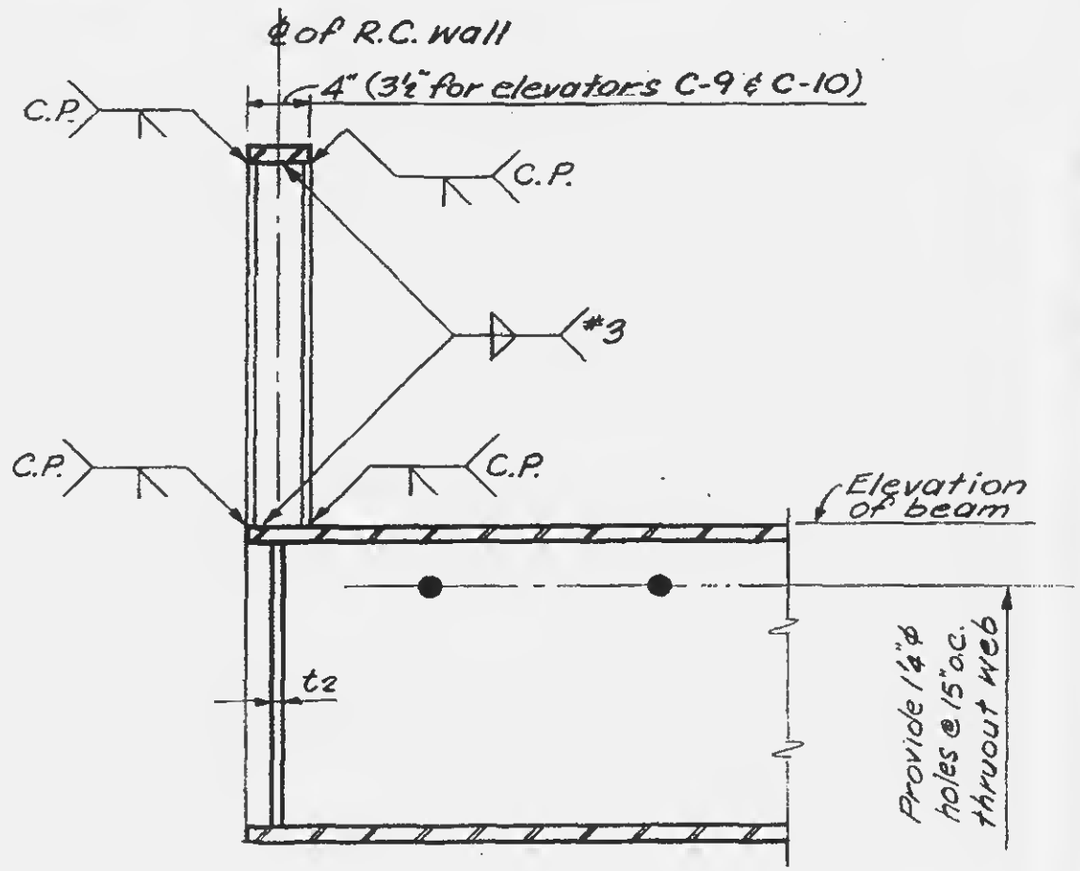
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PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF "BUMPER" BEAM FOR ELEVATORS | DATE: 5-26-69

REVISIONS
5-26-70



Elevation



Section a-a

DETAIL No.	MEMBER SIZE	DIMENSIONS					WELD SIZE		
		t_1	t_2	b	h_1	h_2	#1	#2	#3
A	21 WF 112	2"	¾"	16"	4'-0"	2'4"	⅜	C.P.	⅜
B	21 WF 112	1"	½"	8"	2'-0"	2'4"	5/16	½	¼
C	18 WF 85	1¼"	⅝"	10"	2'-6"	2'4"	5/16	C.P.	5/16
D	21 WF 127	2"	¾"	16"	4'-0"	2'4"	⅜	C.P.	⅜
E	16 B 31					6"			
F	18 WF 64	1"	⅜"	8"	2'-6"	2'4"	⅜	C.P.	¼
G	21 B 49	1"	⅜"	8"	2'-0"	2'4"	5/16	C.P.	¼
H	18 B 40	1"	⅜"	8"	2'-0"	2'4"	5/16	C.P.	¼
J	21 WF 55	2"	⅝"	14"	3'-0"		5/16	C.P.	⅜
K	21 WF 62	2"	⅝"	14"	3'-0"		5/16	C.P.	⅜
L	21 WF 55	1⅜"	⅜"	10"	2'-6"		5/16	C.P.	¼
M	21 B 44					2'4"			

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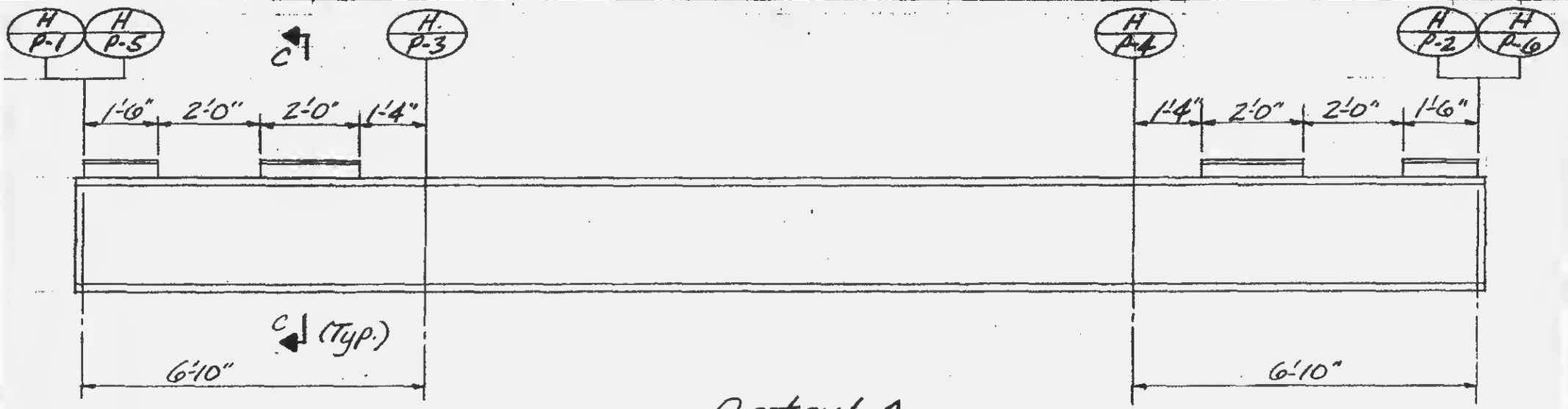
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12-JK1-70F

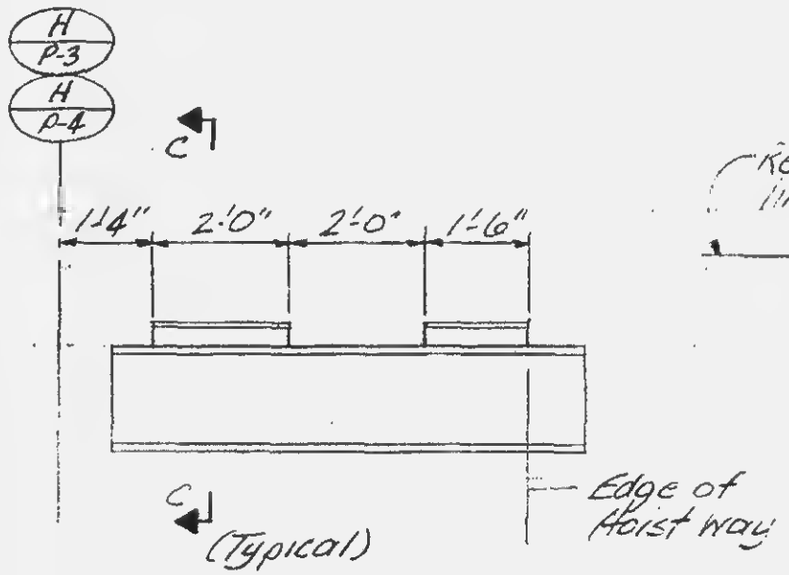
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM DETAIL-ELEVATOR PITS | DATE: 1-16-72

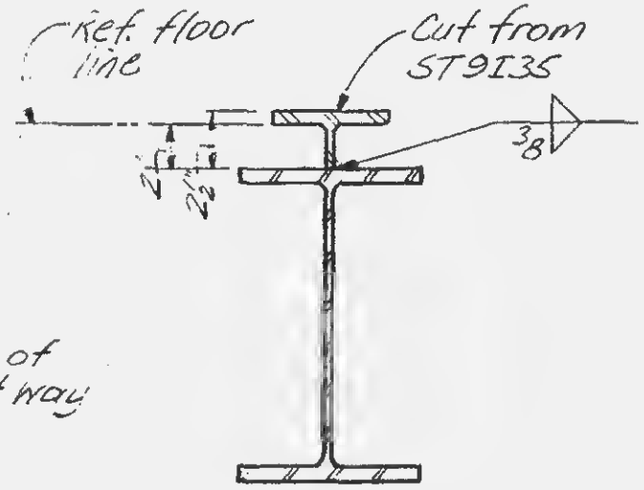
REVISIONS



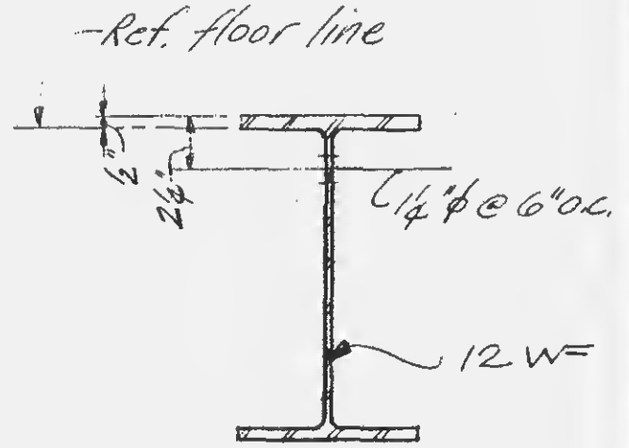
Detail A



Detail B



Detail C



Section D-D

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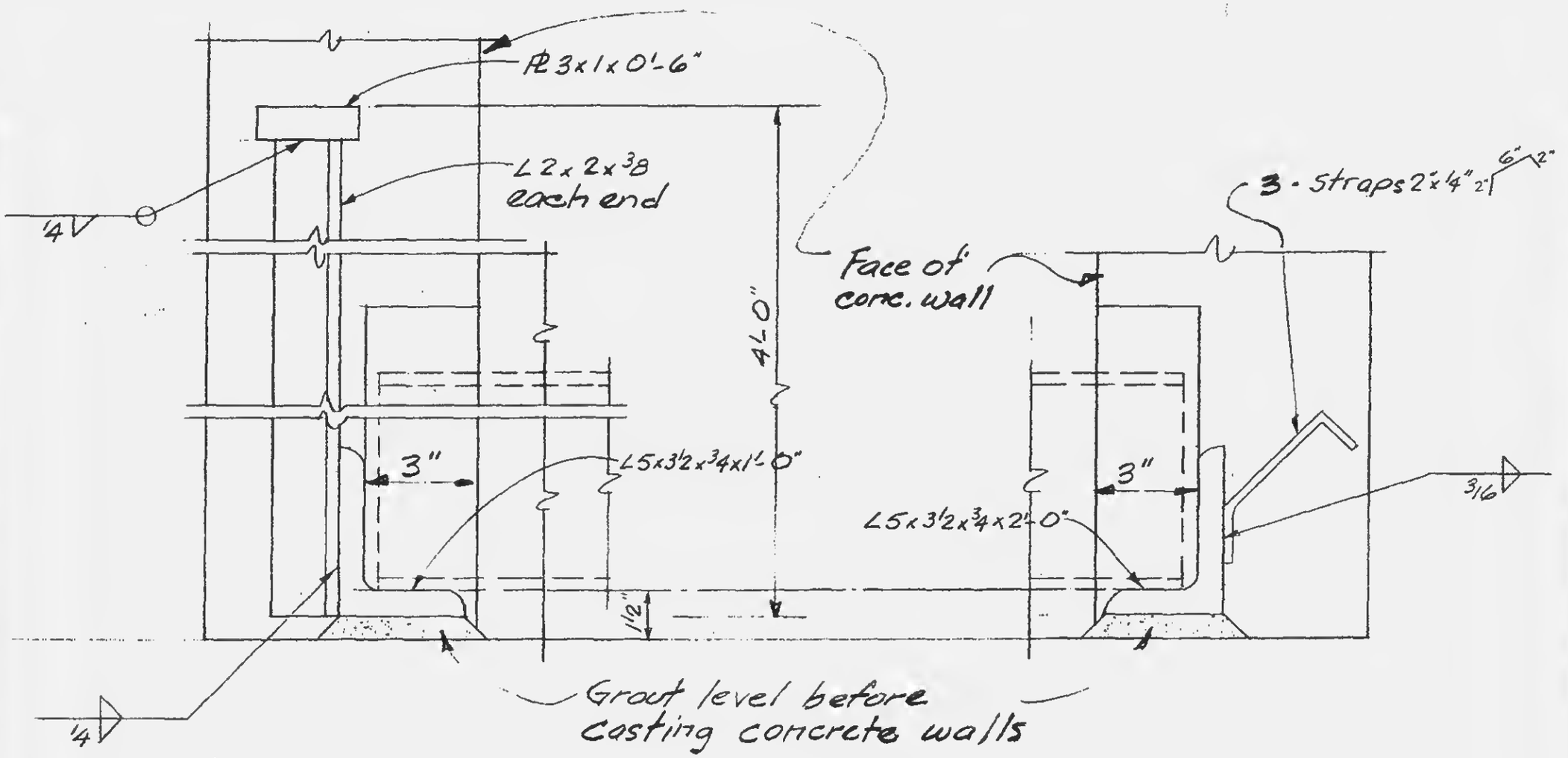
Z-JKI-70G

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PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM DETAILS - ELEVATOR PITS | DATE: 1-15-72

REVISIONS

3-10-72 Complete Rev.



Detail E

Detail F

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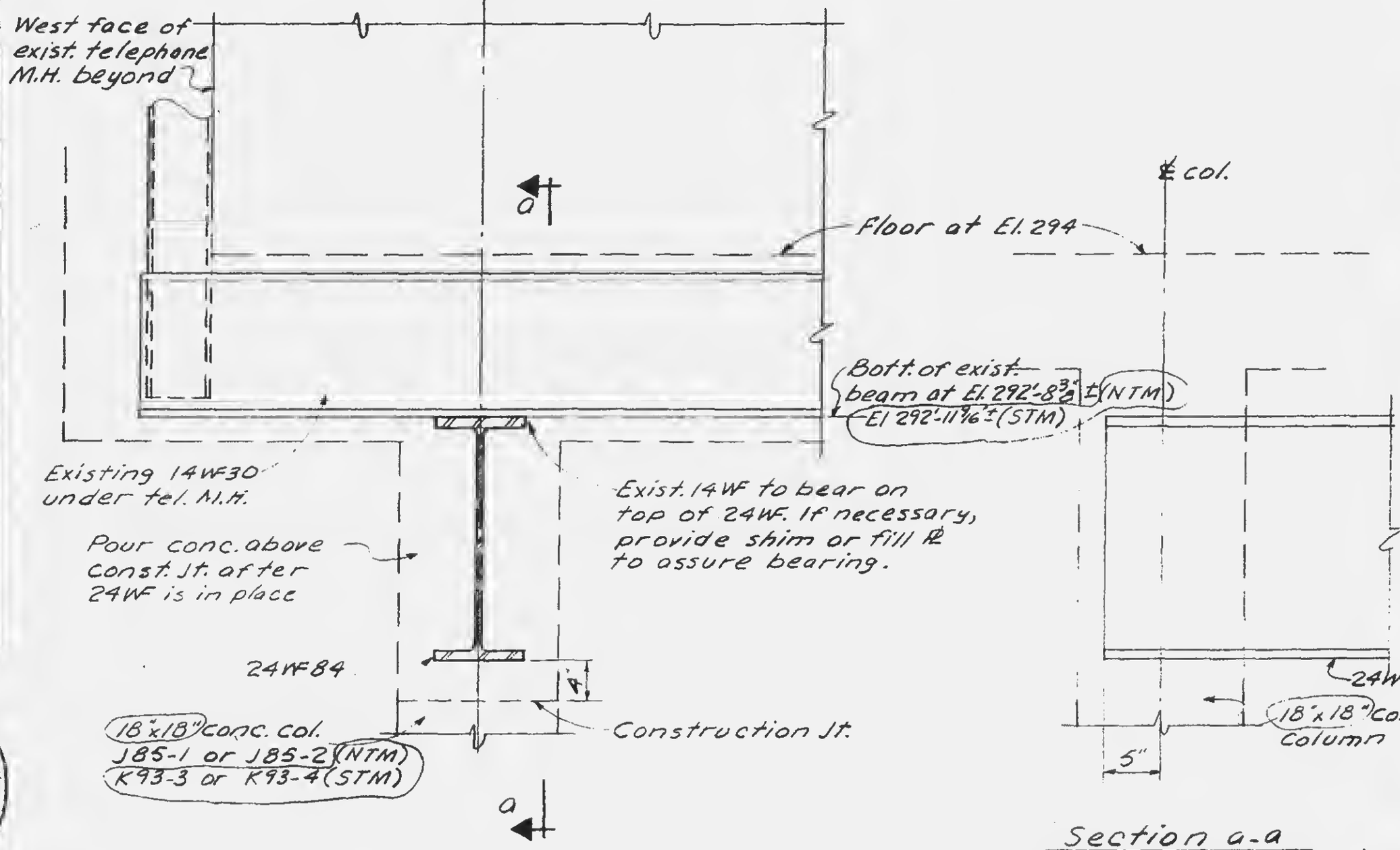
12-JK1-70H

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PROJECT THE WORLD TRADE CENTER | TITLE BEAM DETAIL UNDER EXIST. TEL. MANHOLE | DATE 4-5-68

REVISIONS
3-21-69

85 93



Section a-a
(Opp. hand at col. J85-1)

Notes:
1. (NTM) — North telephone manhole.
(STM) — South telephone manhole.

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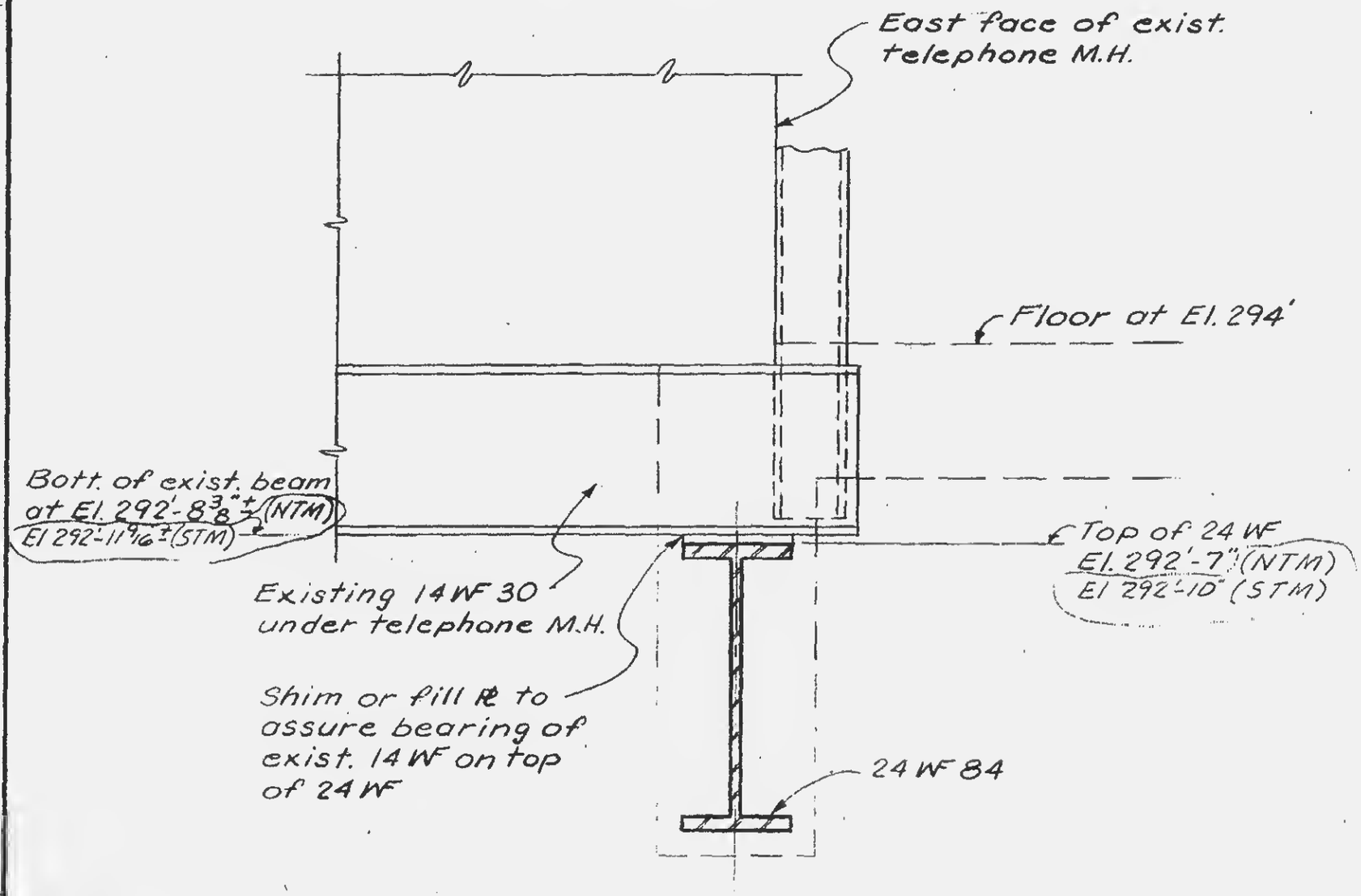
12-JK1-71

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE BEAM DETAIL UNDER EXIST. TELEPHONE MANHOLE | DATE 4-5-68

REVISIONS

3-21-69



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Notes:
1. (NTM) — North telephone manhole.
(STM) — South telephone manhole.

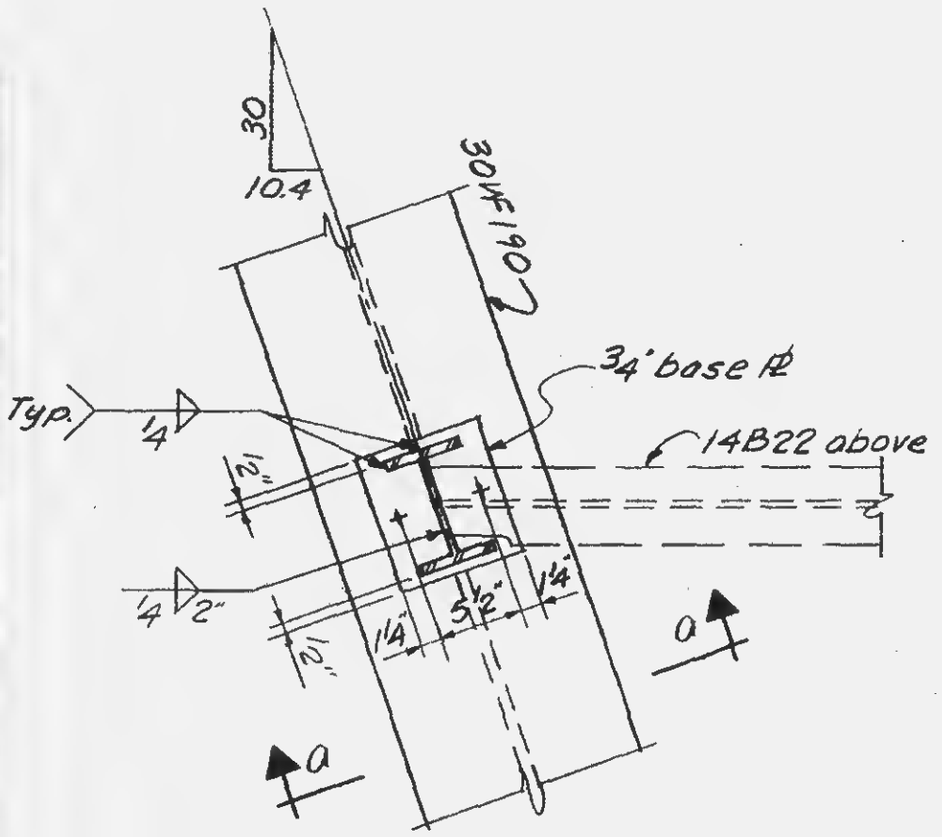
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12-JK1-72

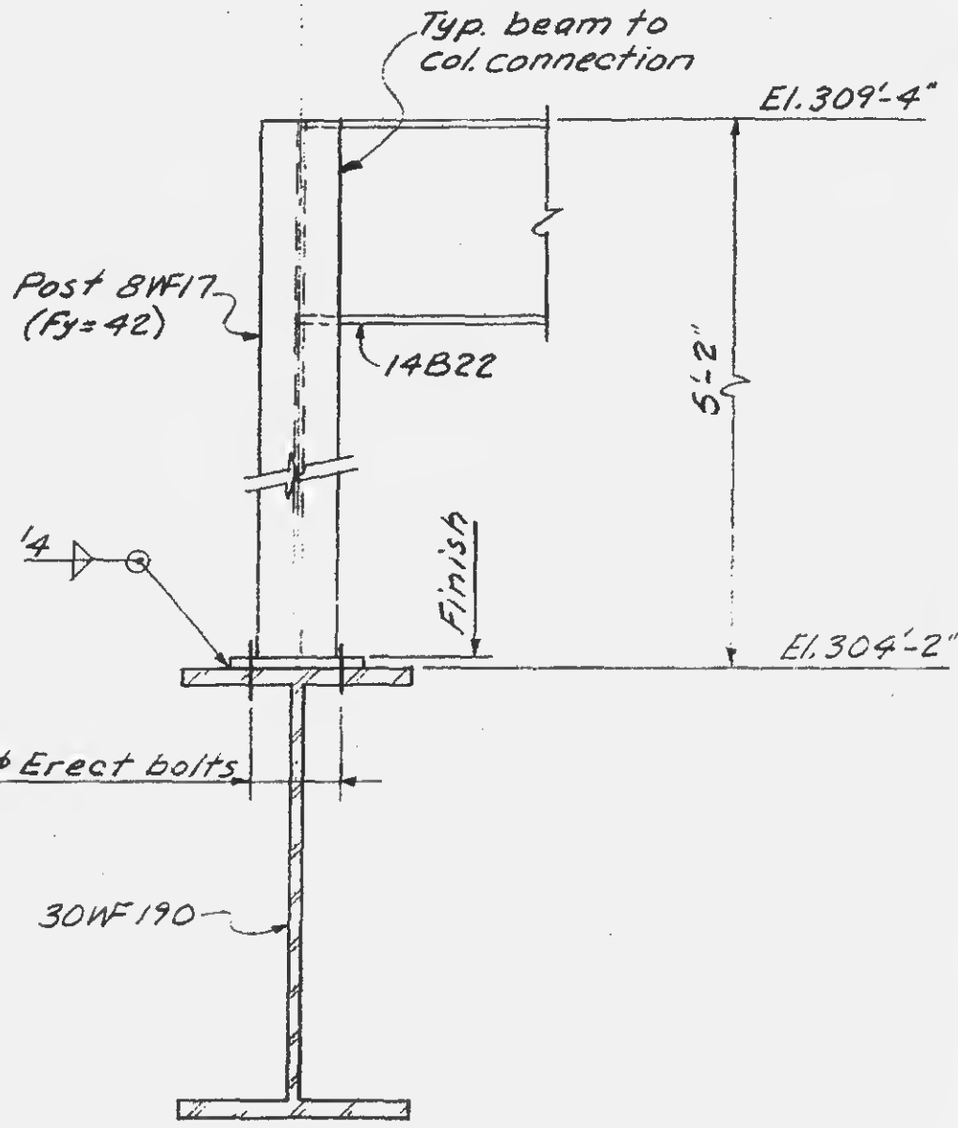
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF POSTS | DATE 4-5-68

REVISIONS



Plan



Section a-a

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12-JK1-73

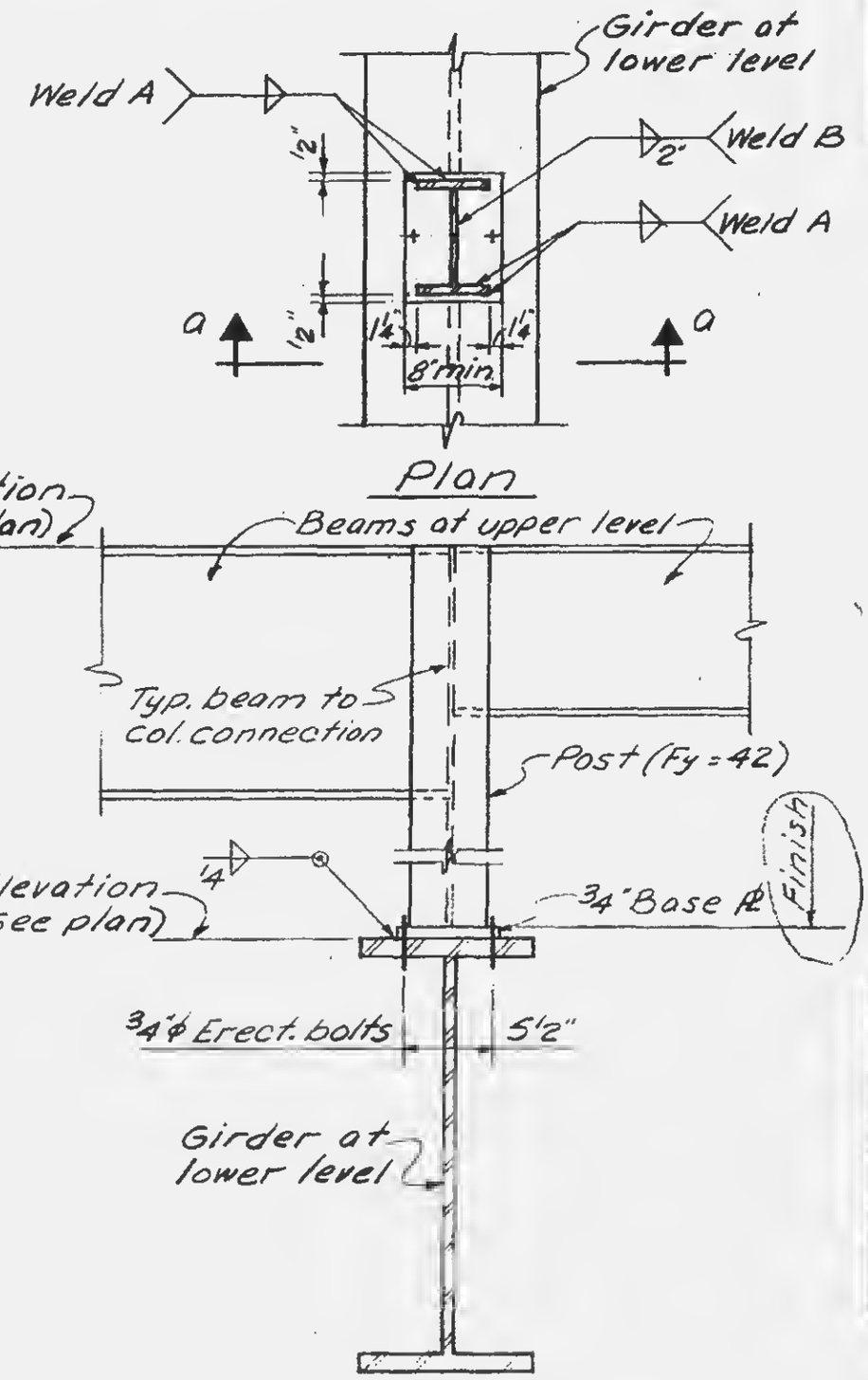
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF POSTS | DATE: 4-5-68

REVISIONS
6-7-68
2-4-69
3-21-69

Detail No.	Size of Post	Weld A	Weld B
1	8WF17	1/4	1/4
2	10WF33	1/4	1/4
3	10WF49	5/16	1/4
4	10WF33	1/4	1/4

Detail No.	Size of Post	Weld A	Weld B



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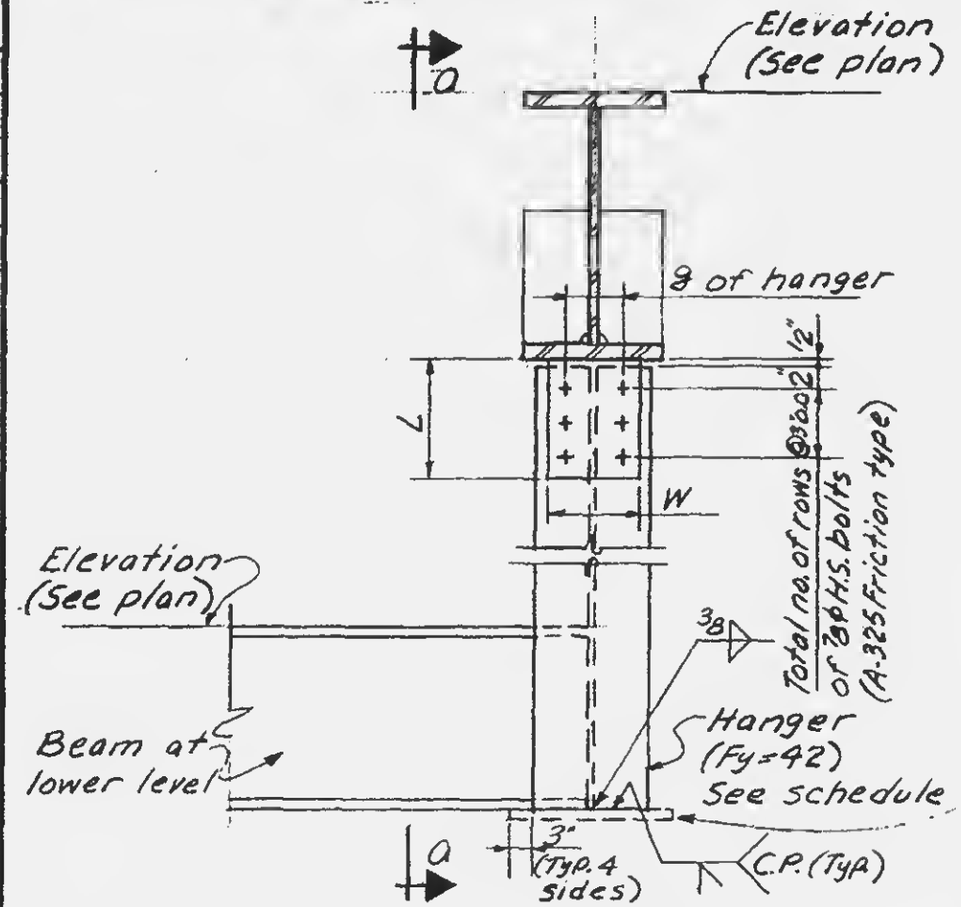
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12-JK1-74

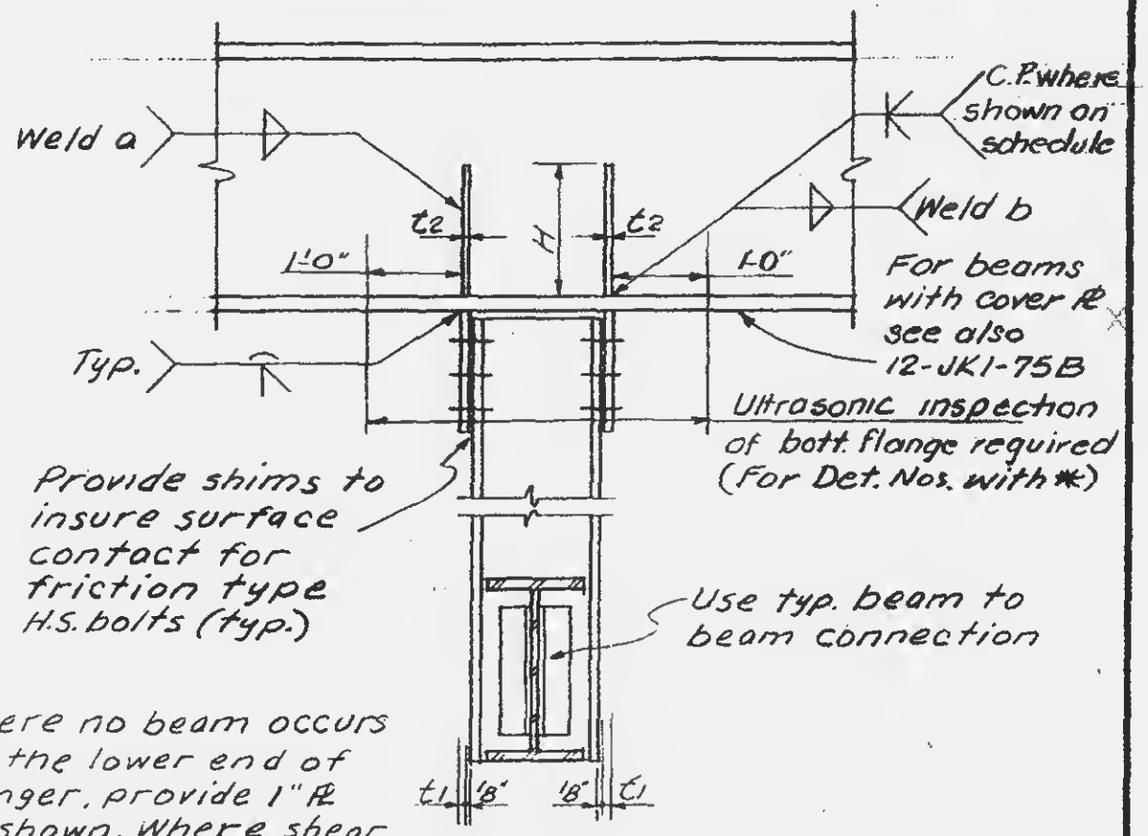
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PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF HANGERS | DATE 4-5-68

REVISIONS
6-7-68
7-19-68
9-4-68
11-5-68
1-8-69
3-21-69
7-19-72



Elevation



Where no beam occurs at the lower end of hanger, provide 1" PL as shown. Where shear head occurs see detail on 10-JK2-35

Section a-a

Detail No.	Size of Hanger	Plates t1	t2	L	W	H	No. of Rows of Bolts	Weld a	Weld b
1	12WF50	5/8	3/8	7"	8 1/2"	10"	2	1/4	1/4
2	12WF50	5/8	3/8	10"	8 1/2"	12"	3	1/4	5/16
3 *	12WF36 (See col. sch.)	3/4	3/4	13"	6"	12"	4	3/8	C.P.
4 *	12WF36 (See Col. sch.)	3/4	3/4	16"	6"	14	5	3/8	C.P.
5	10WF45	5/8	1/2	16"	8 1/2"	12"	5	5/16	C.P.
6*	14WF142 (See Col. Sch.)	3/4	3/4	13"	8 1/2"	12"	4	3/8	C.P.
7	14WF38	5/8	1/2	13"	6 1/2"	10"	4	5/16	C.P.
8	14WF43	5/8	1/2	10"	8 1/2"	10"	3	5/16	C.P
9	12WF53	5/8	3/8	7"	8 1/2"	10"	2	1/4	1/4

Detail No.	Size of Hanger	Plates t1	t2	L	W	H	No. of Rows of Bolts	Weld a	Weld b

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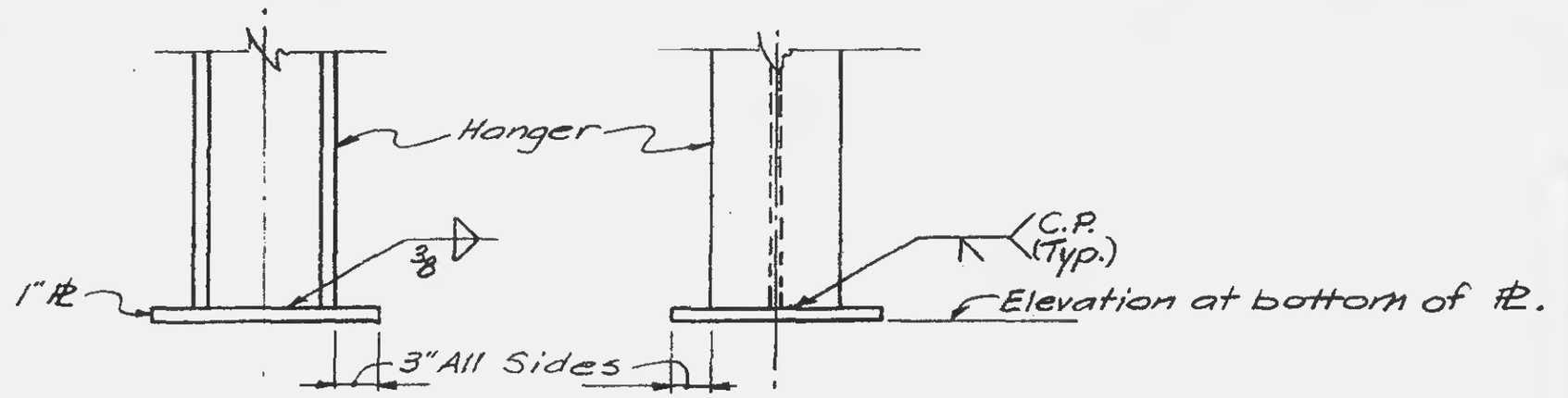
12-24-68
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12-JK1-75

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL AT BOTTOM OF HANGER | DATE: 11-5-68

REVISIONS
4-18-69



Detail No.	Elevation of Bottom ℄
1	El. 272'-7"
2	El. 271'-8"
3	El. 271'-8"
4	El. 271'-8"
5	El. 273'-3"
6	El. 277'-5"
7	El. 277'-5"
8	El. 278'-6"
9	El. 277'-5"
10	El. 267'-11"

Detail No.	Elevation of Bottom ℄

Notes:
1. All ℄s to have Fy = 36 ksi.
2. All welds to be E70xx.

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DRAWN
S.C.

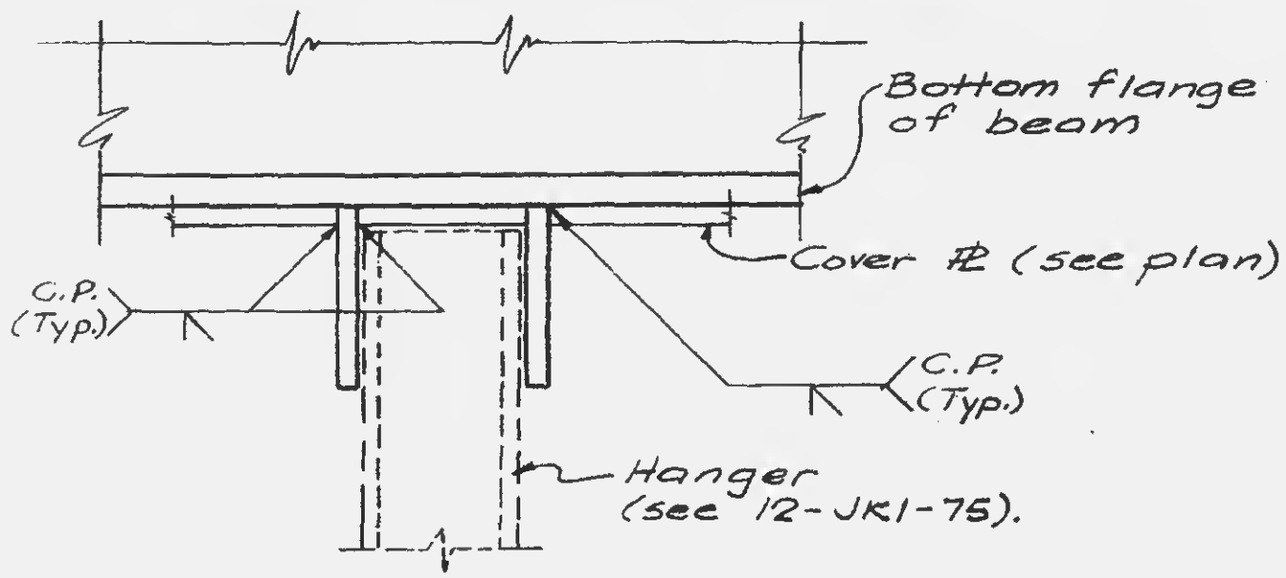
REVIEWED
E.L.

12-JK1-75A

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF HANGER UNDER BEAMS WITH COVER PL | DATE: 11-5-68

REVISIONS



NOTES:

1. All other details, see 12-JK1-75.
2. All welds to be E70XX.

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DESIGNED

DRAWN

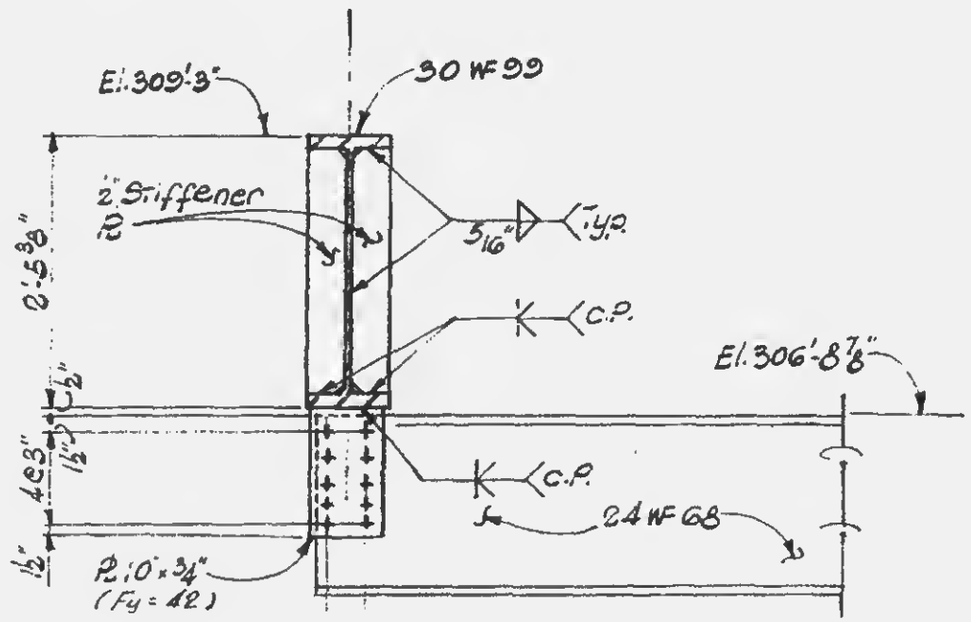
REVIEWED

12-JK1-75B

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF HANGER | DATE 3-21-69

REVISIONS



5/8" ϕ 10-7/8" H.S. Bolts (A325 Friction Type)

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DESIGNED

DRAWN S.T.M.

REVIEWED E.L.

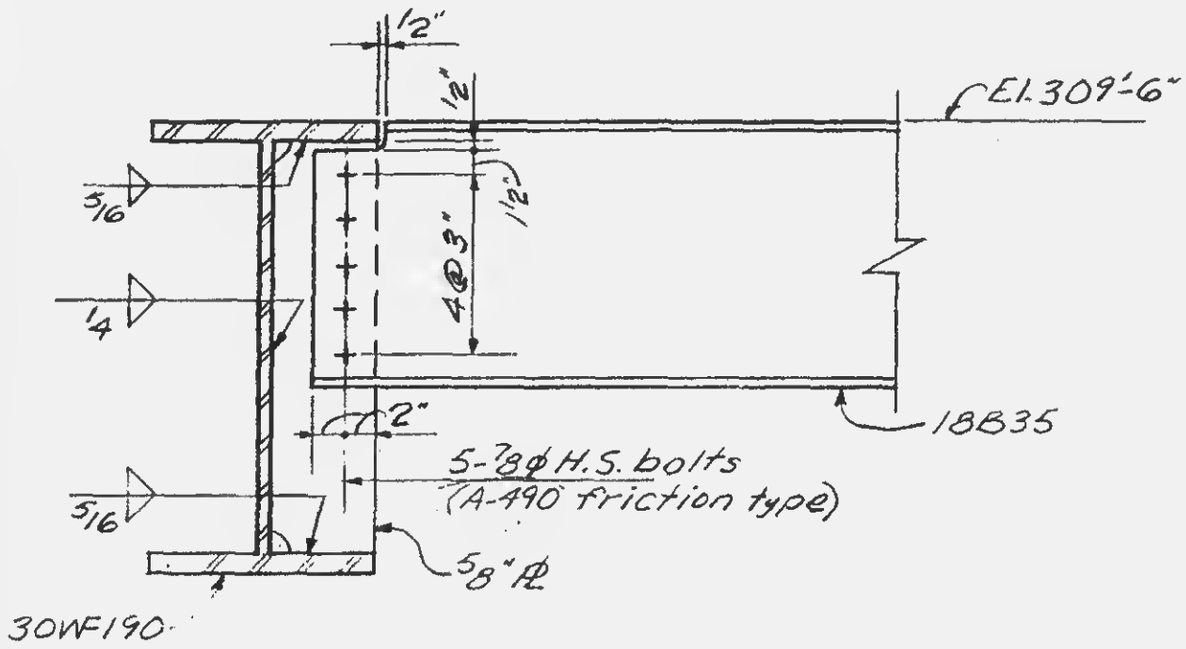
12-JAN-70

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAIL | DATE 4-5-68

REVISIONS

7-19-68



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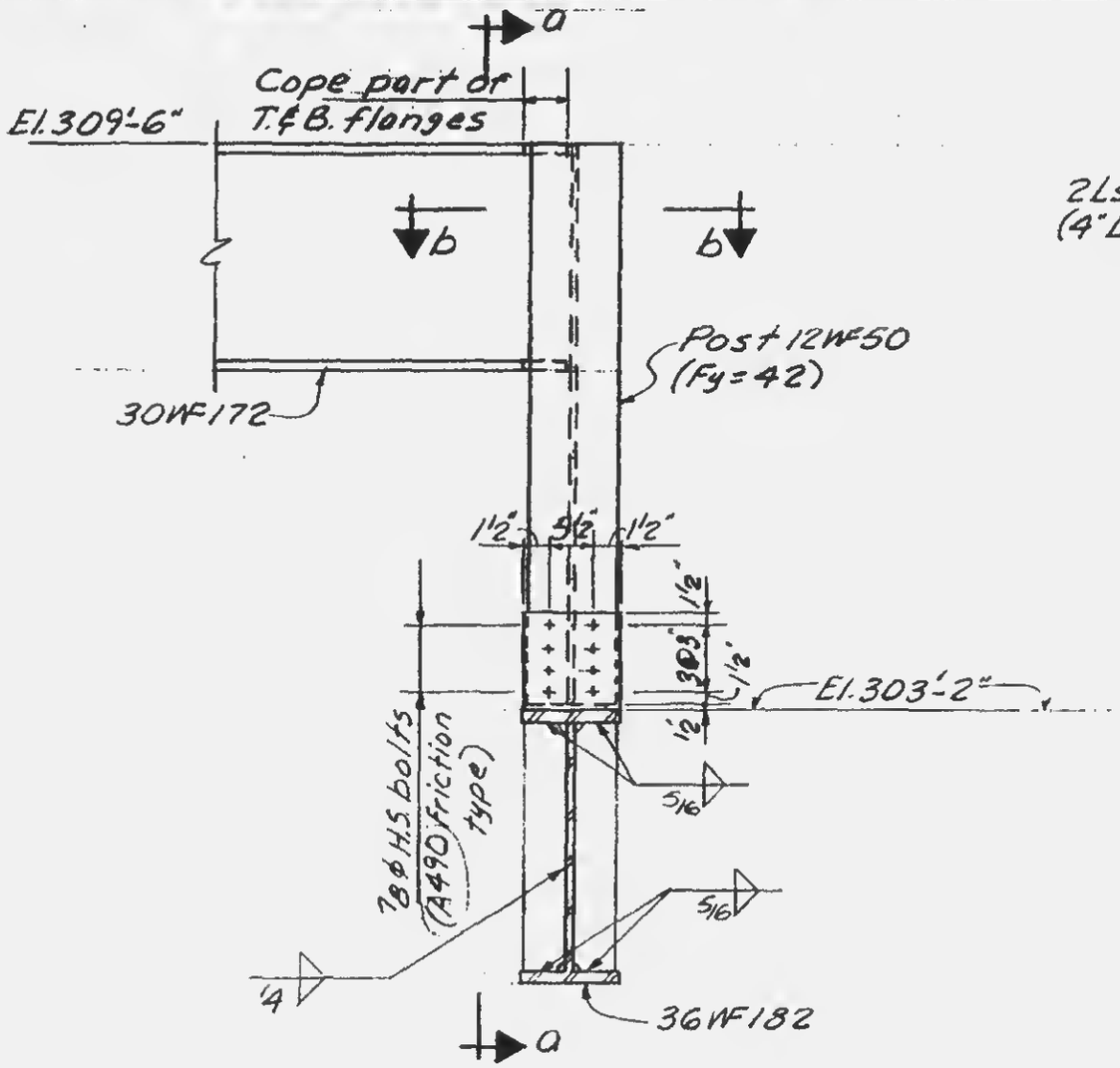
12-JK1-76

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

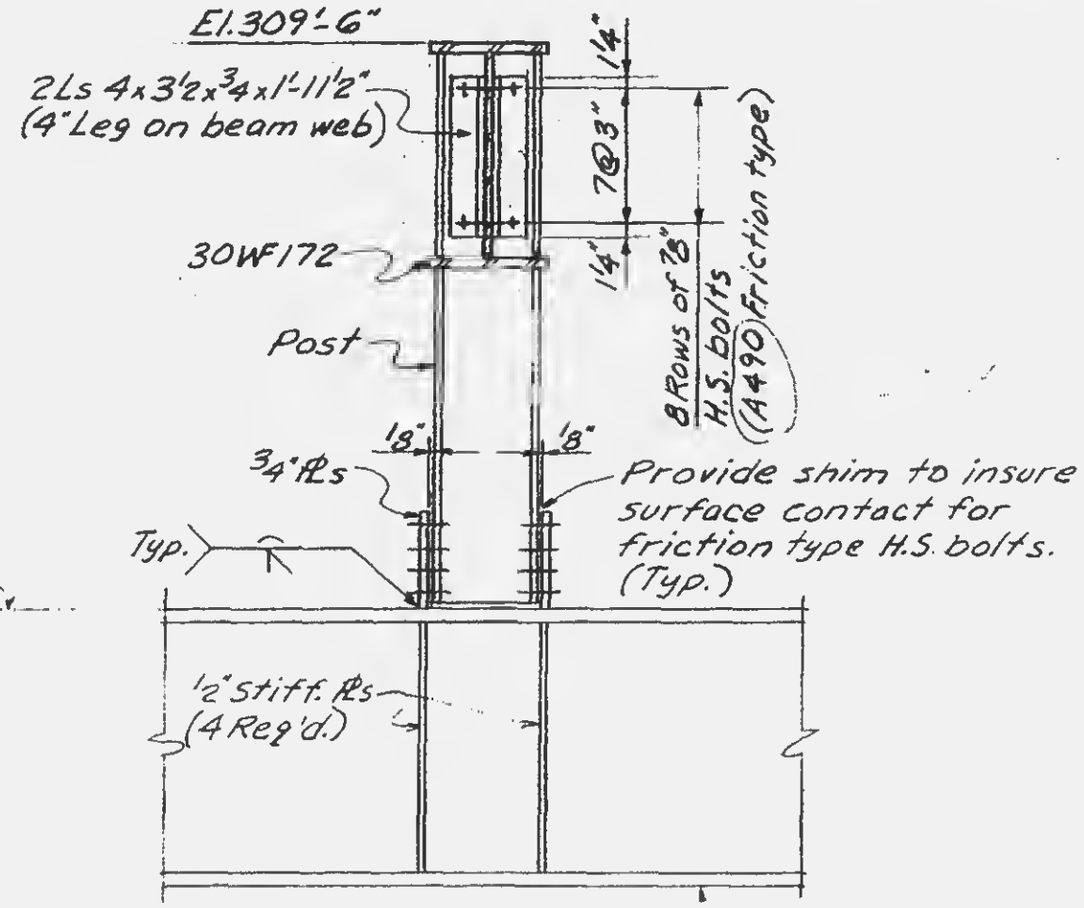
PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF POSTS | DATE 4-5-68

REVISIONS

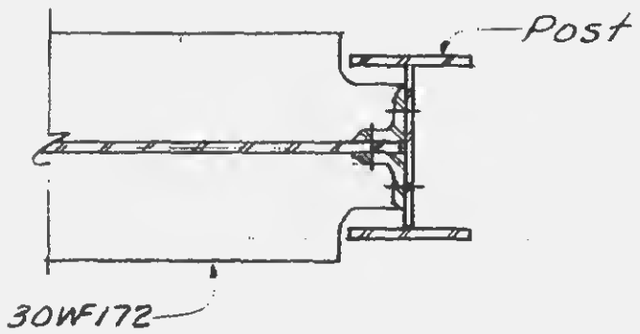
7-19-68



Elevation



Section a-a



Section b-b

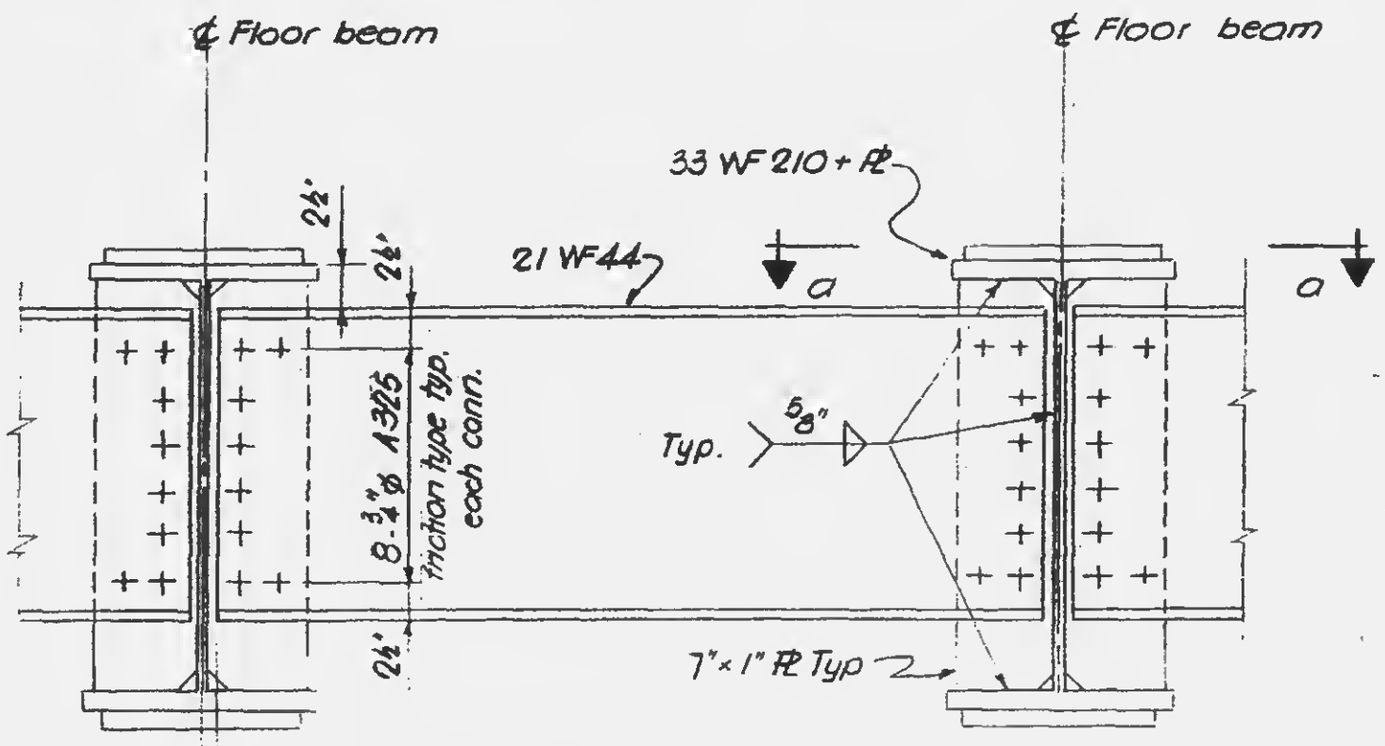
LICENSED PROFESSIONAL ENGINEER
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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-77

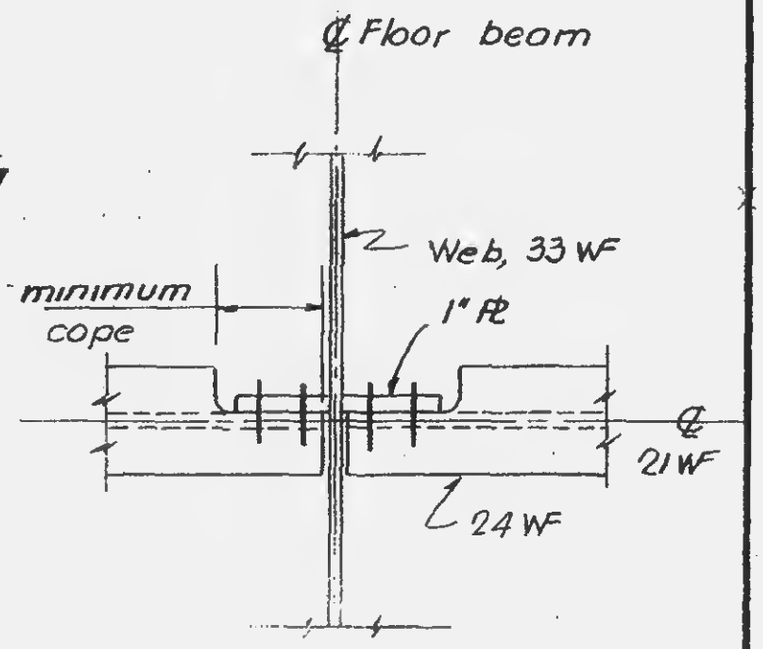
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: FLOOR BEAM DIAPHRAGM DETAILS | DATE: 6-7-68

REVISIONS



Elevation - typical Diaphragm



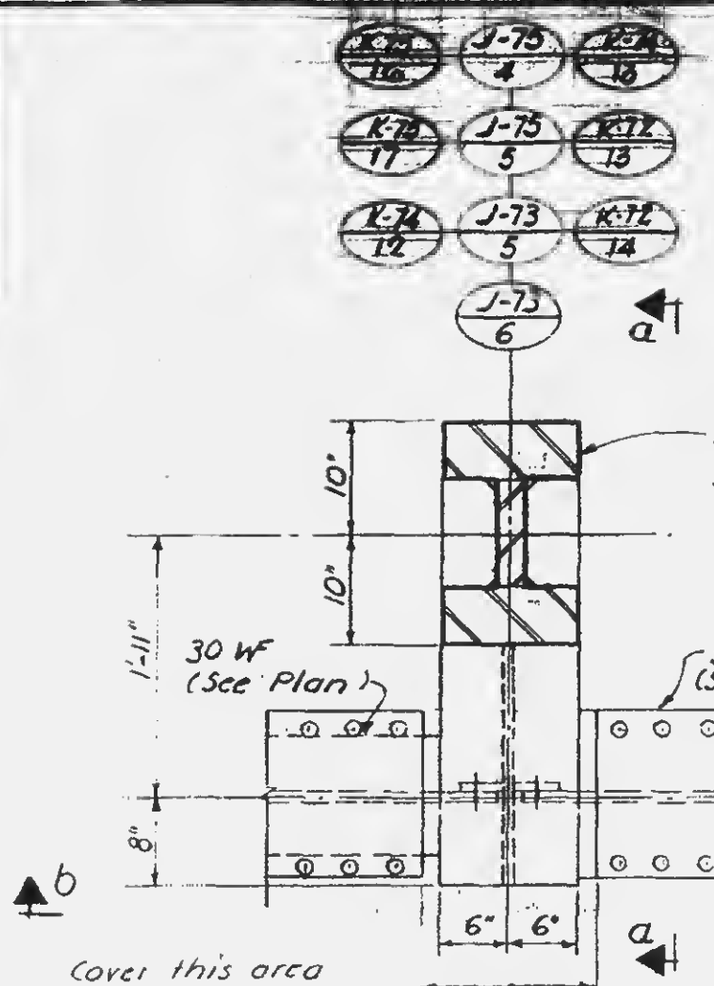
Section a-a

Ref dwgs: S1-76, S1-77

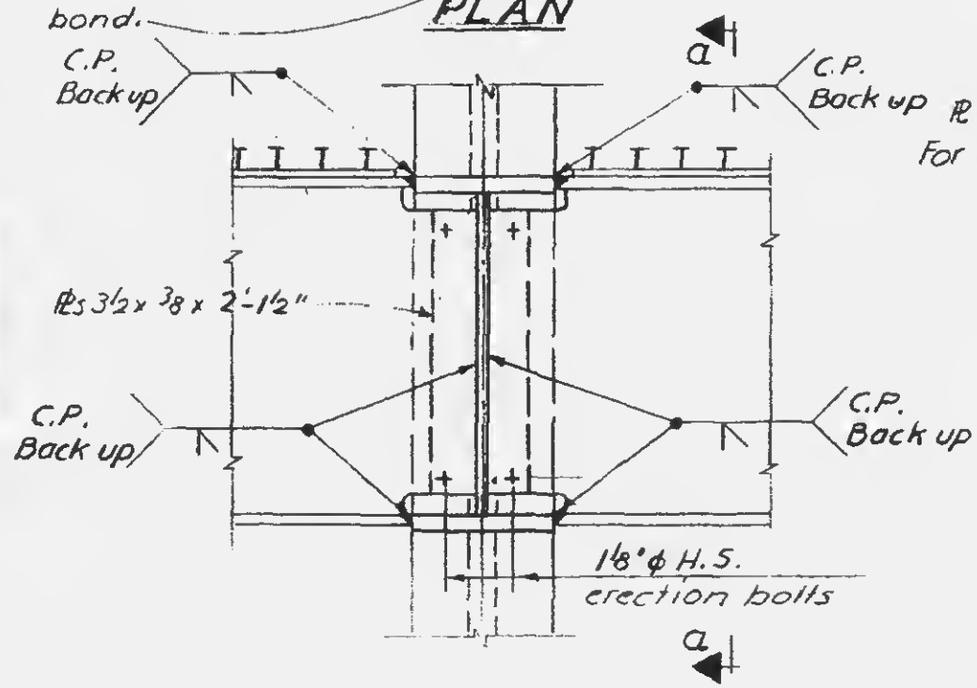
12-JK1-78

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UNIVERSITY OF THE STATE OF NEW YORK

REVISIONS



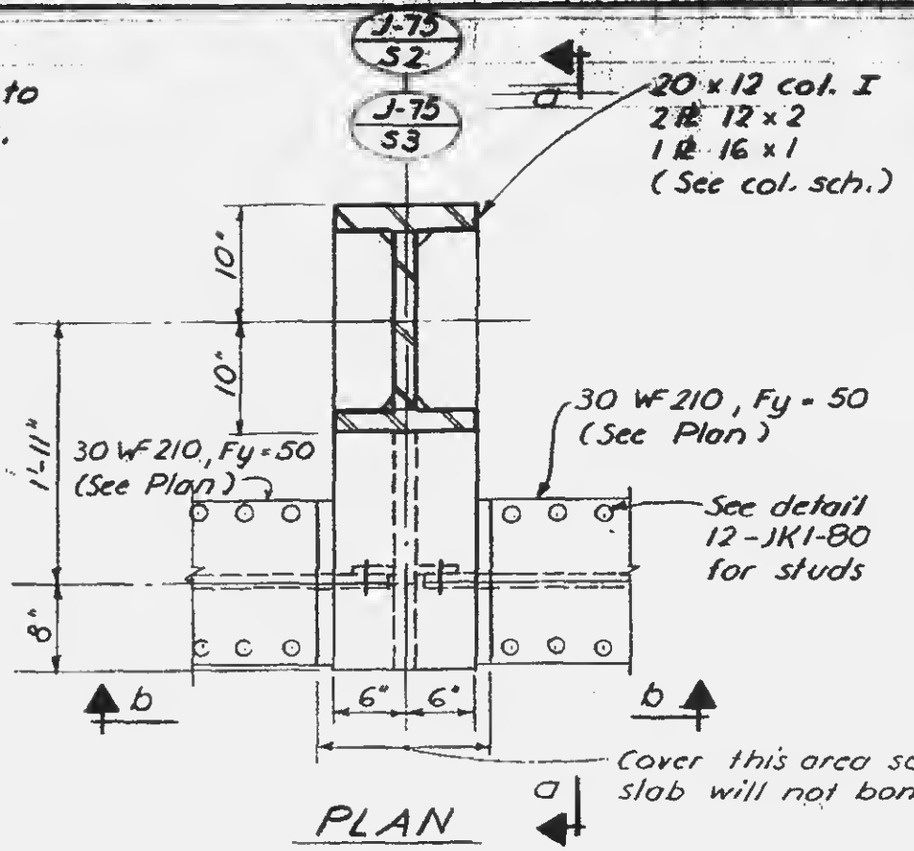
PLAN



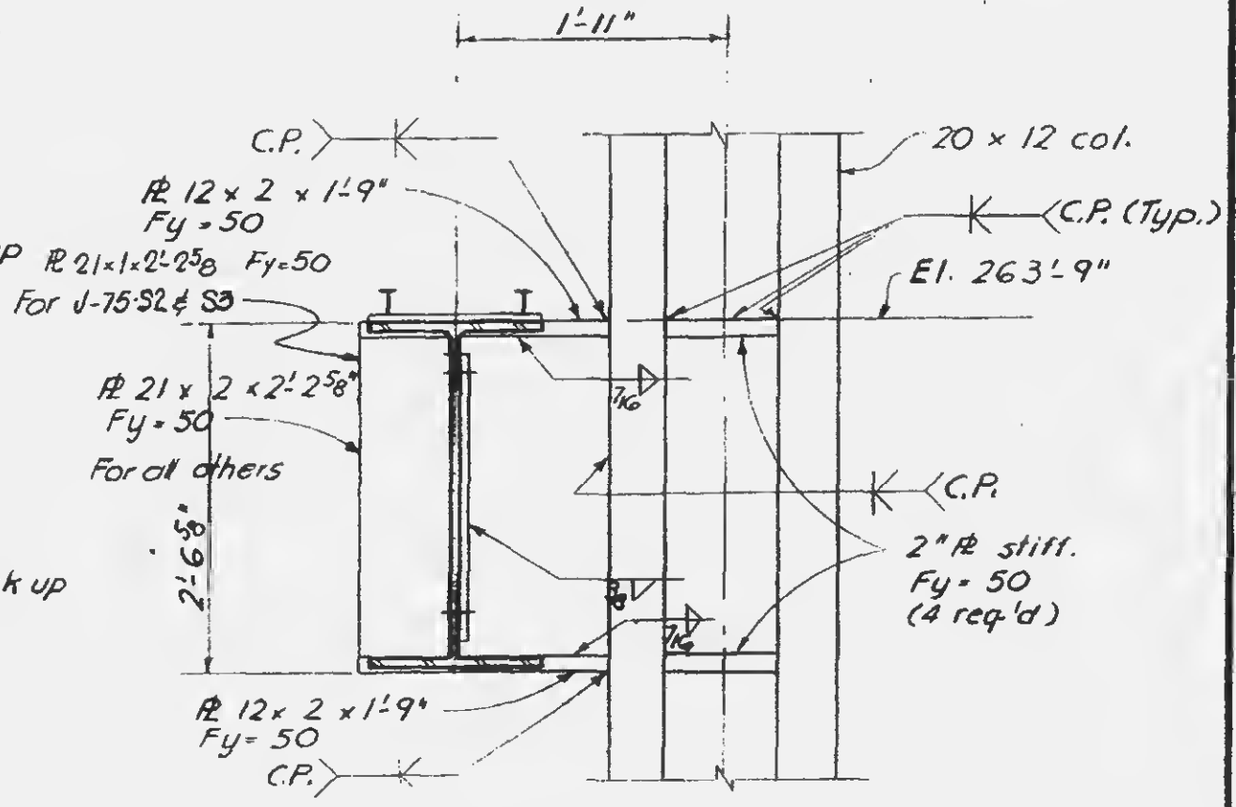
Section b-b

Notes:

1. All welds to be E 70xx.



PLAN



Section a-a

12-JK1-79

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REVISIONS

7-19-68

9-4-68

PROJECT

K-73 / 13 — J-74 / 4

K-73 / 14 — J-74 / 5

J-72 / 5

J-72 / 6

a

20 x 12 col.
2 PL 12 x 5
2 PL 10 x 4
(See col. sch.)

10"

10"

1'-11"

30 W
(See Plan)

30 W
(See Plan)

See detail this sheet for studs

8"

6" 6"

a

Cover this area so slab will not bond

PLAN

a

C.P. Back up

C.P. Back up.

PL 3½ x ⅜ x 2'-1½" - F.S.

PL 3½ x ⅜ x 2'-1½" - F.S.

C.P. Back up

C.P. Back up.

1⅛" ϕ H.S. erection bolts

a

ELEVATION

Notes

1. All welds to be E 70 xx.

⅞" Shear studs @ 4" c.c.

6" 6"

15 x ½ PL, Fy = 50 full length of beam.

2¾" 2¾"

⅞" ϕ A490 bolts in 1 5/16" holes @ 3½" c.c. Nuts to be tightened after slab has been post-tensioned. Provide washers 1⅞ x 9/16 (Sq. or round) Fy = 50 Ksi

Shear Stud Detail

(Typical all beams this area.)

(see 12-JK2-5)

1'-11"

C.P.

PL 12 x 2 x 1'-9" Fy = 50

20 x 12 col.

El. 263'-9"

PL 21 x 2 x 2'-2⅝" Fy = 50

2'-6⅝"

7/16

C.P.

⅜

7/16

PL 12 x 2 x 1'-9" Fy = 50

C.P.

Section a-a

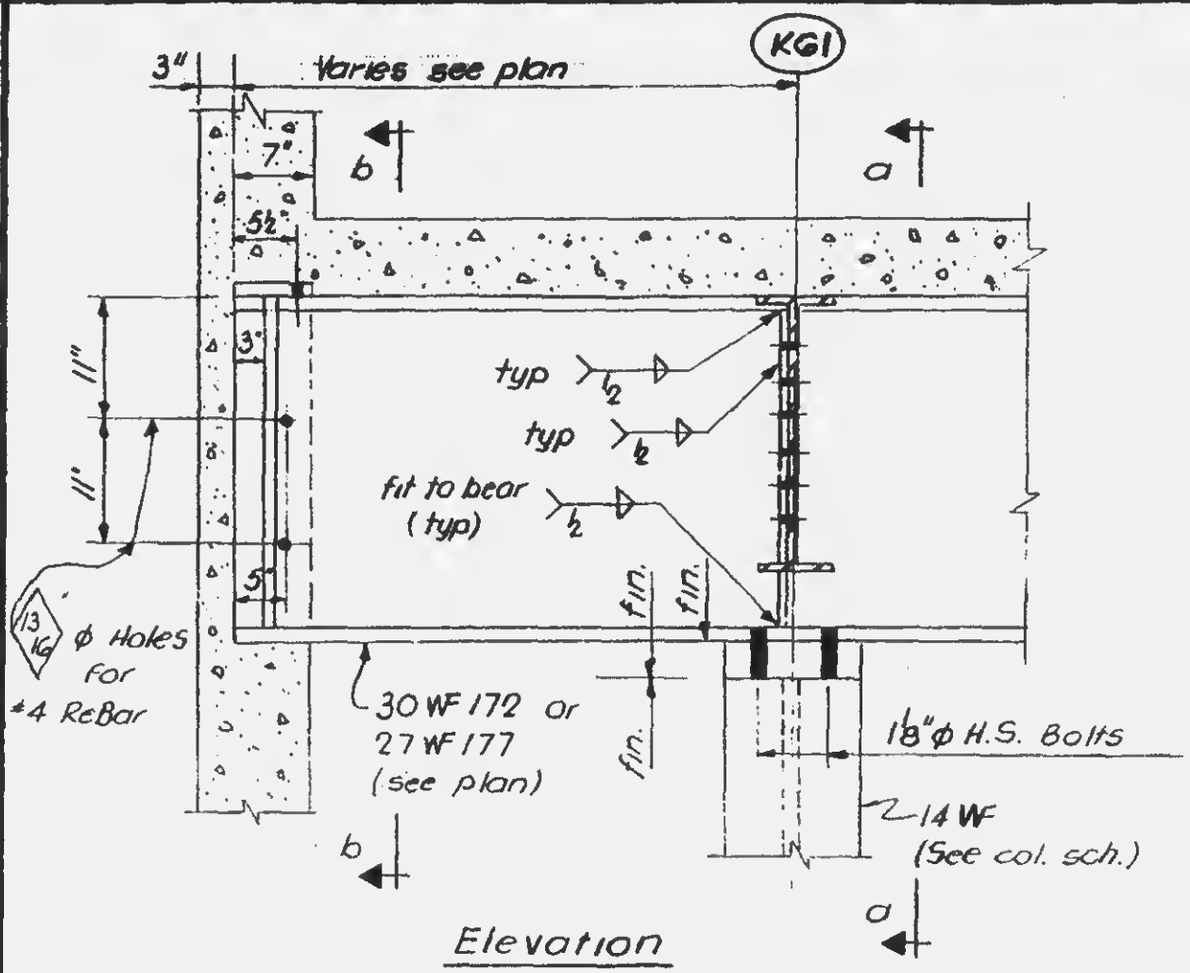
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12-JK1-80

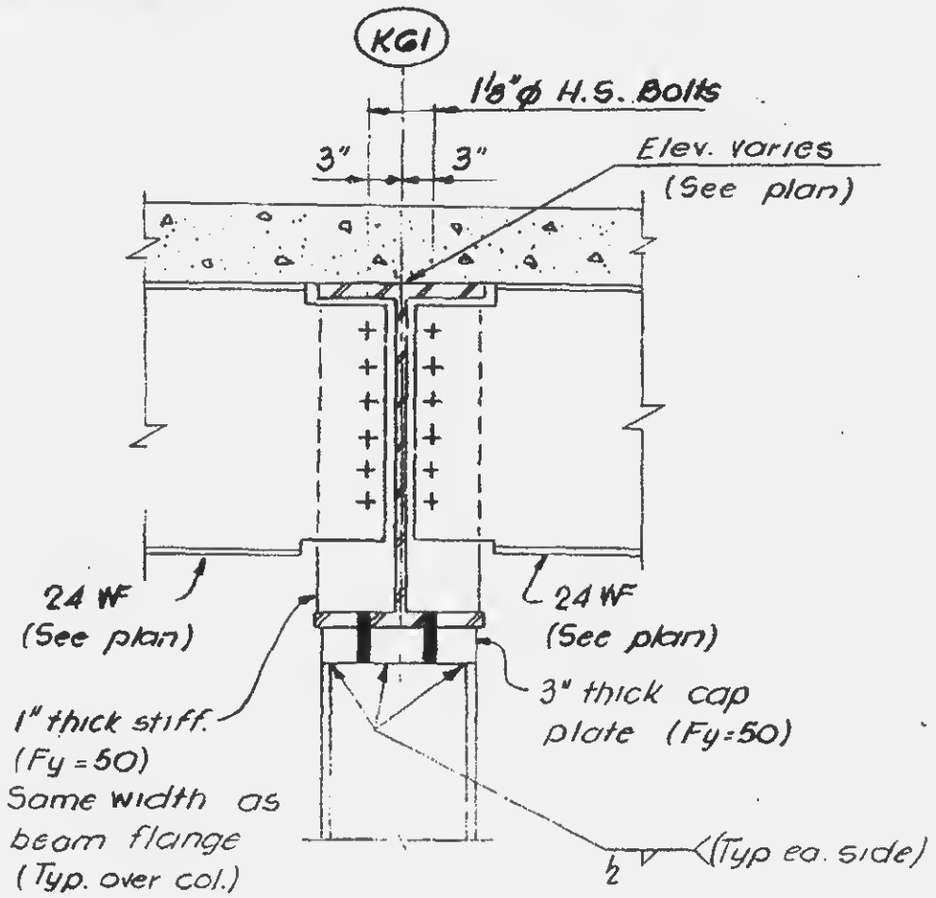
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM CONNECTION DETAILS | DATE: 6-11-68

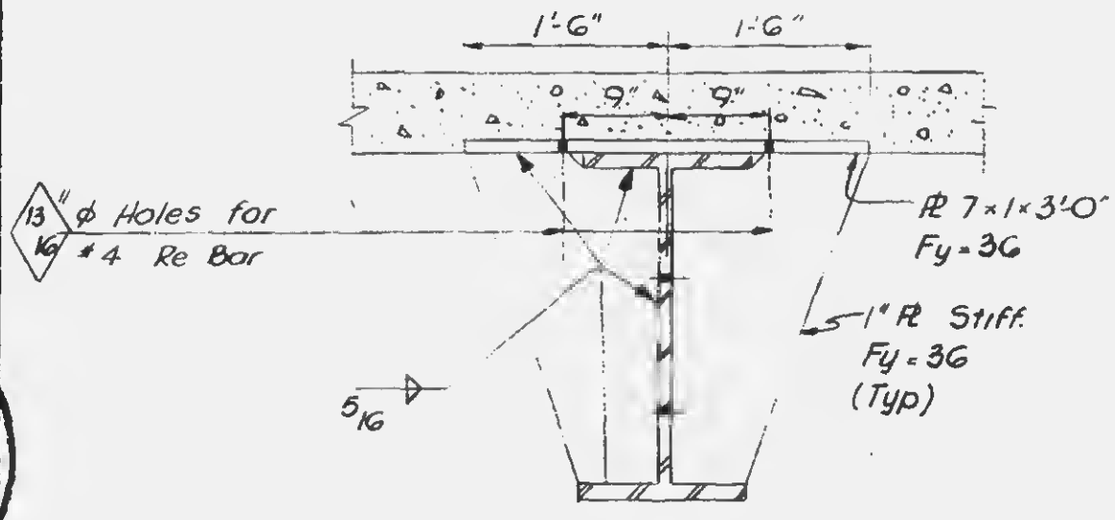
REVISIONS



Elevation



Section a-a



Section b-b

Notes:

1. All welds to be E 70 xx.
2. All bolts to be A325 friction type, unless noted.

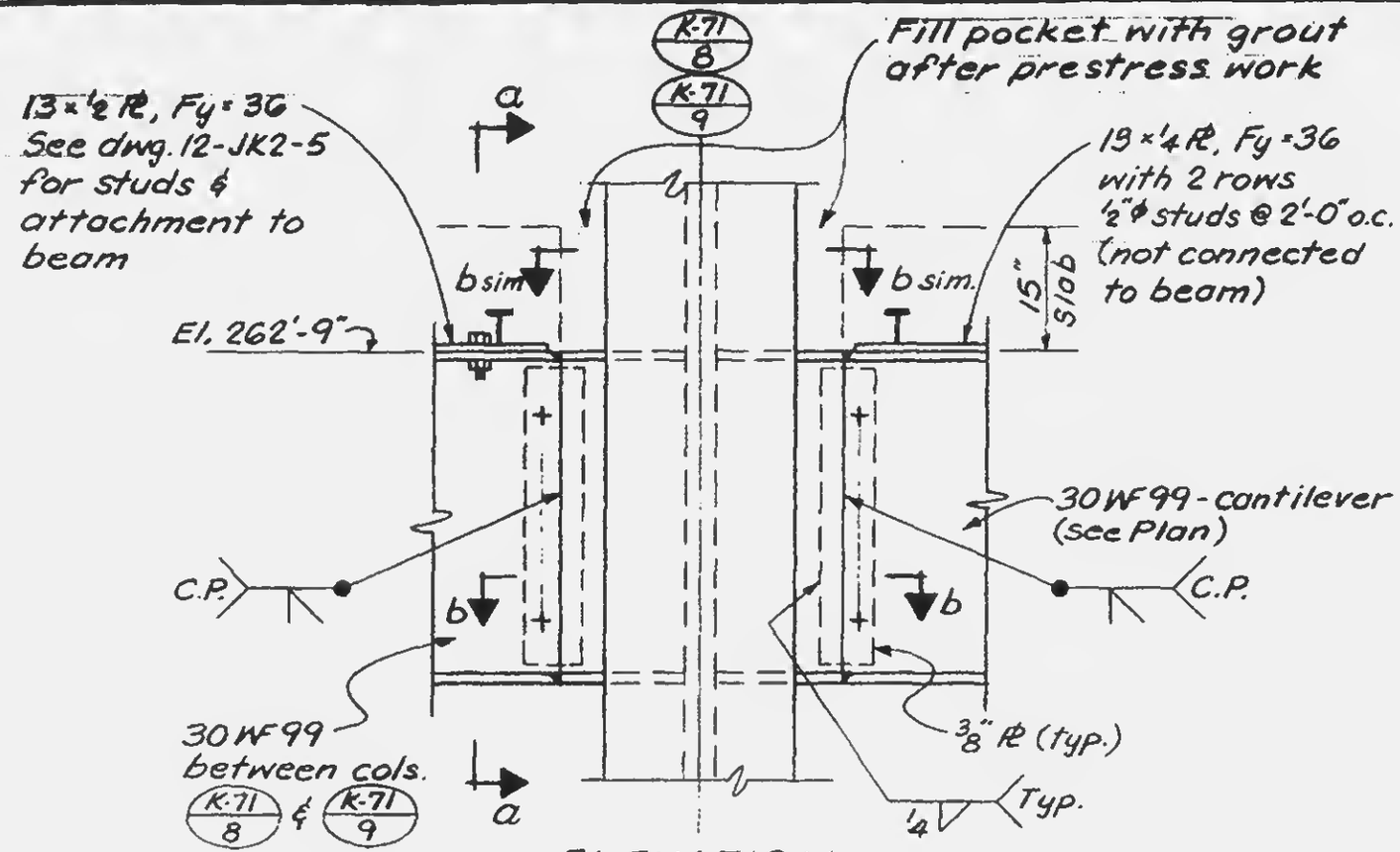
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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-81

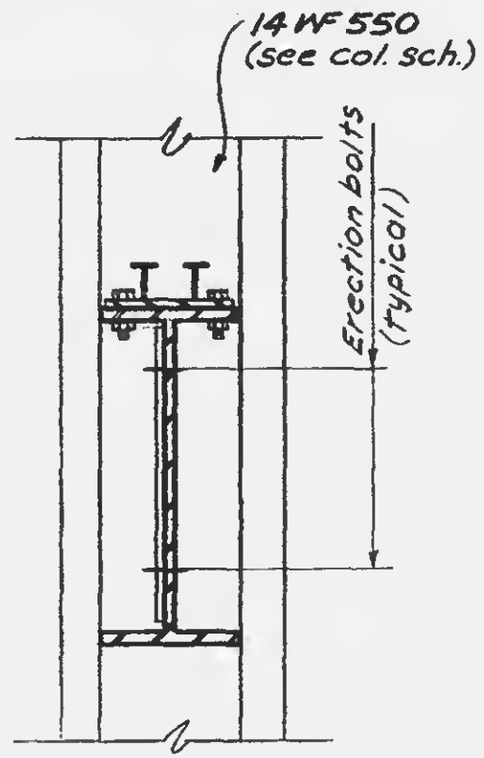
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM CONNECTION DETAIL | DATE: 6-28-68

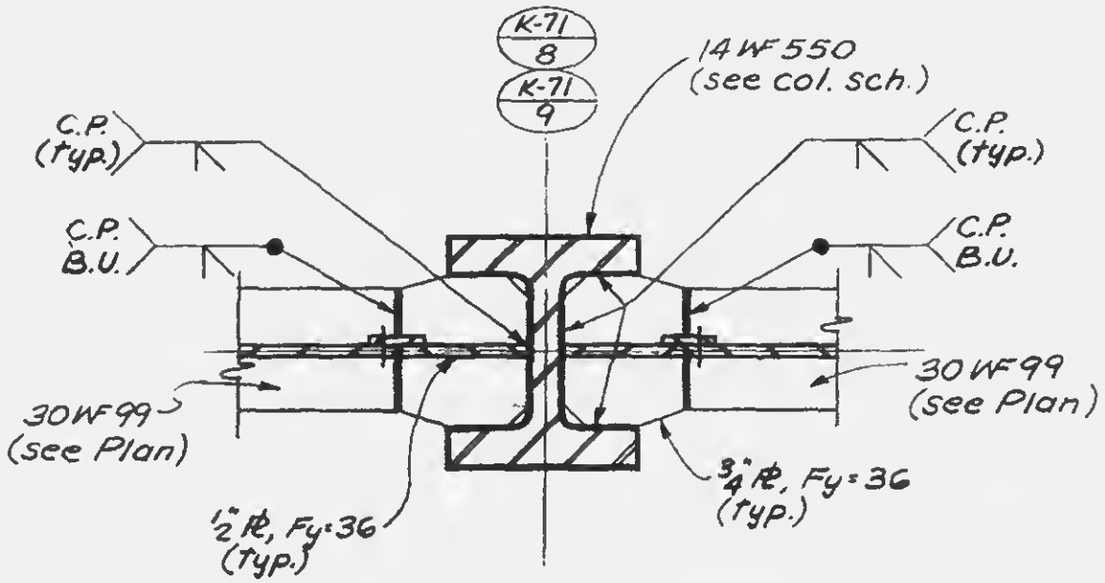
REVISIONS



ELEVATION



Section a-a



Section b-b

Note:
1. All welds to be E70xx.
2. All bolts to be A325 friction type.

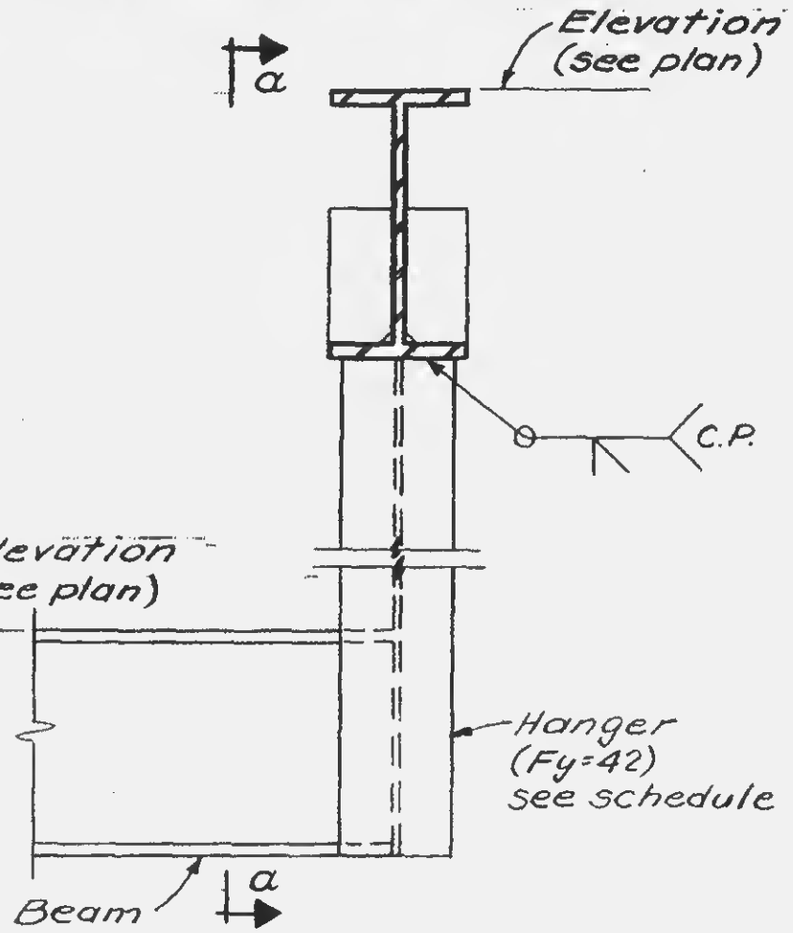
LESLIE E. ROBERTSON — LICENSED PROFESSIONAL ENGINEER — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-82

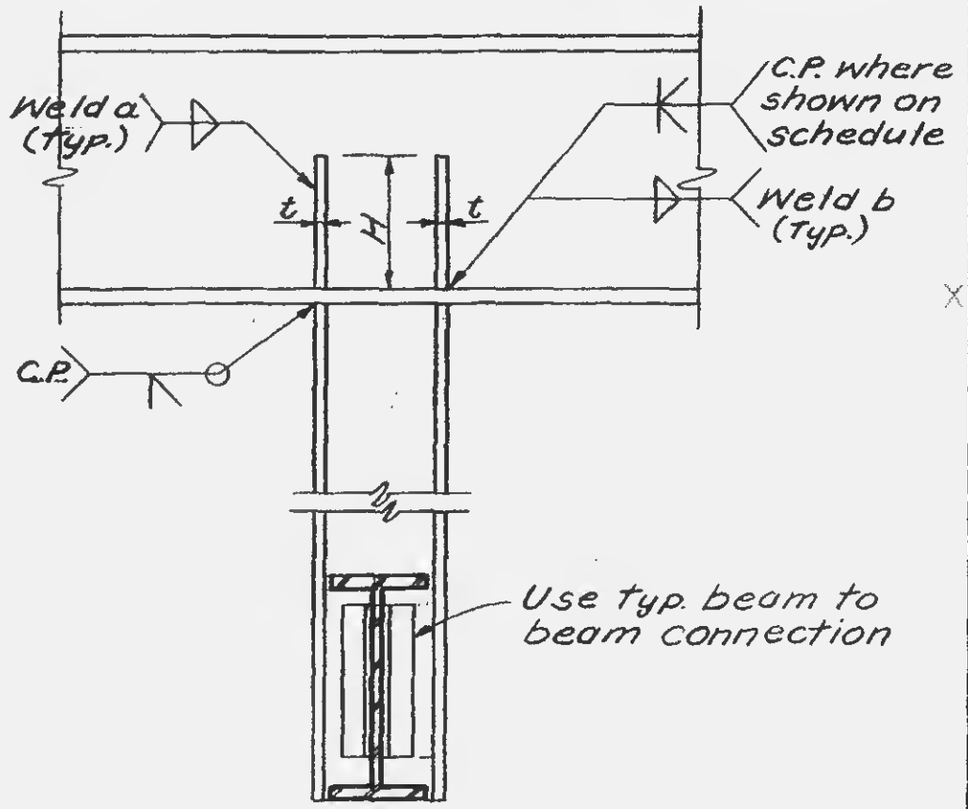
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF HANGER | DATE: 8-15-68

REVISIONS



ELEVATION



Section a-a

Detail No.	Size of Hanger	Plates t	Plates H	Weld a	Weld b
1	14WF43	1/2	12"	1/4	C.P.

Detail No.	Size of Hanger	Plates t	Plates H	Weld a	Weld b

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DESIGNED

DRAWN

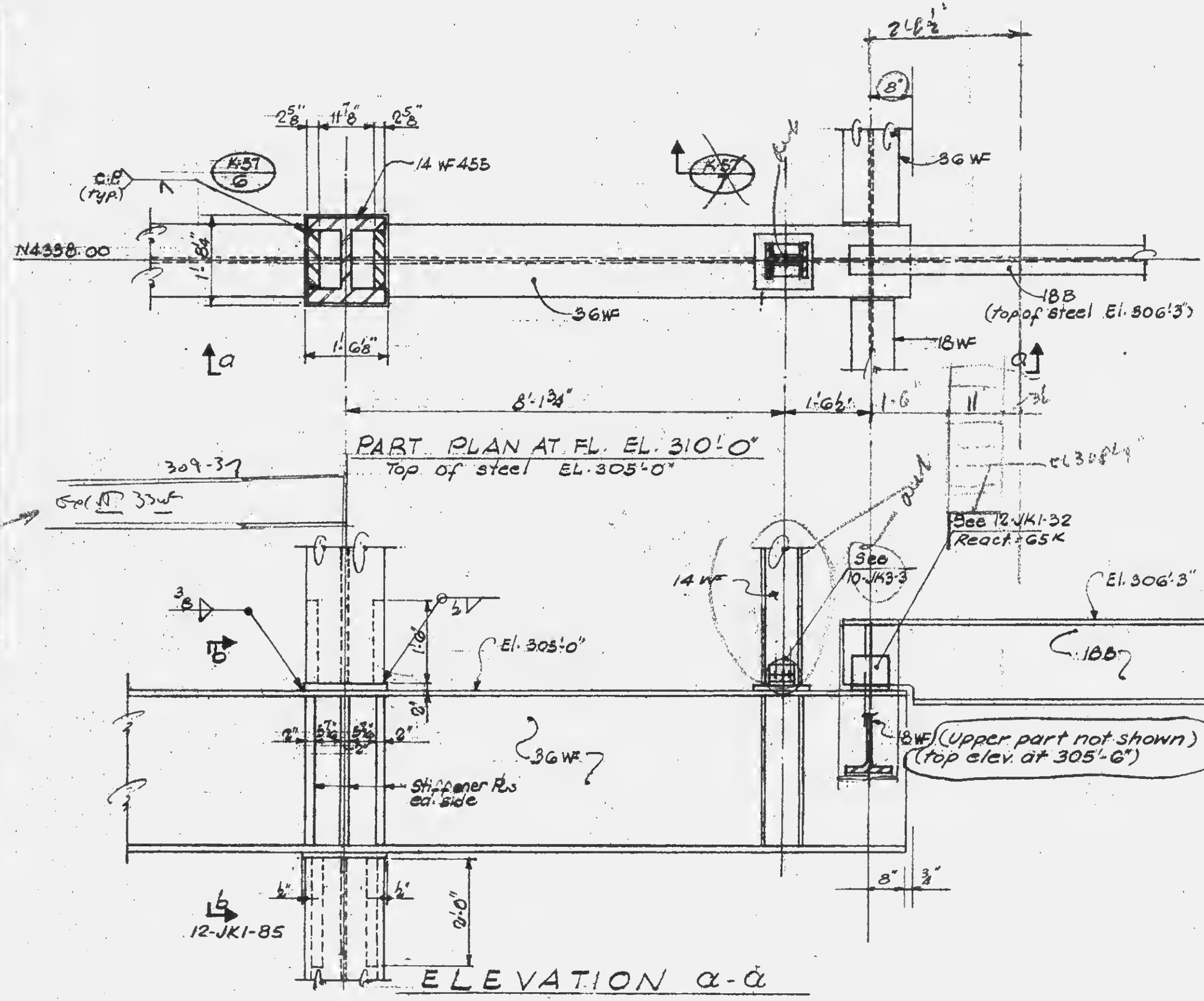
REVIEWED

12-JK1-83

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAILS | DATE 3-21-69

REVISIONS
5-29-69



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No. 34360
THE STATE OF NEW YORK

DESIGNED
DRAWN S.T.M.
REVIEWED E.L.

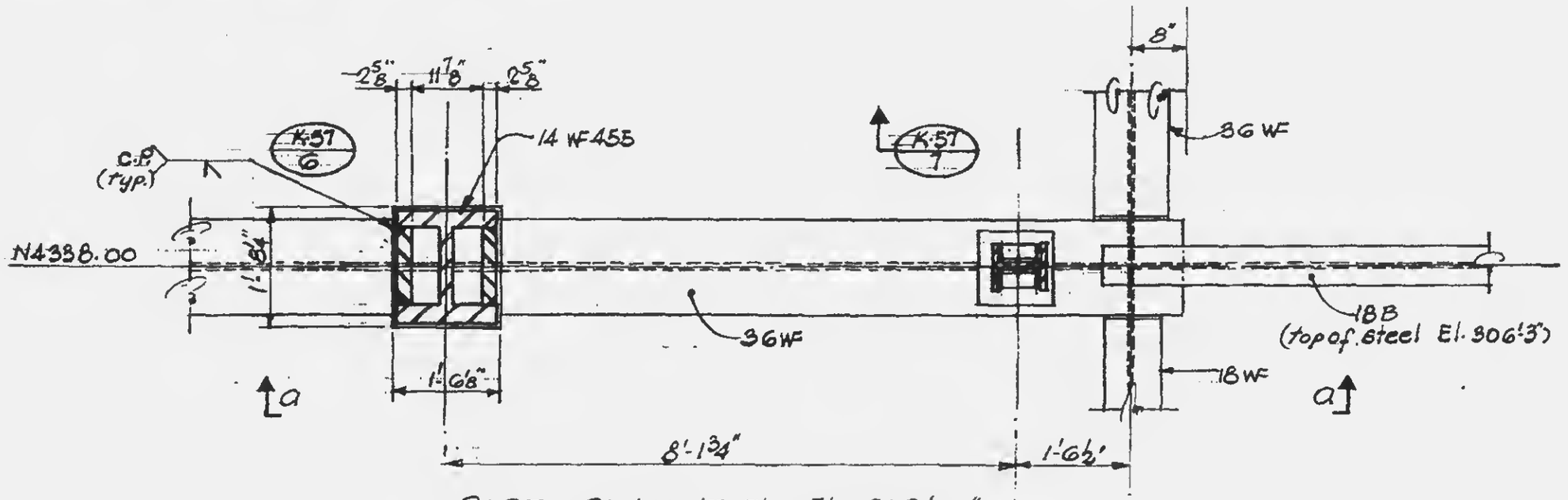
12-JK1-84

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

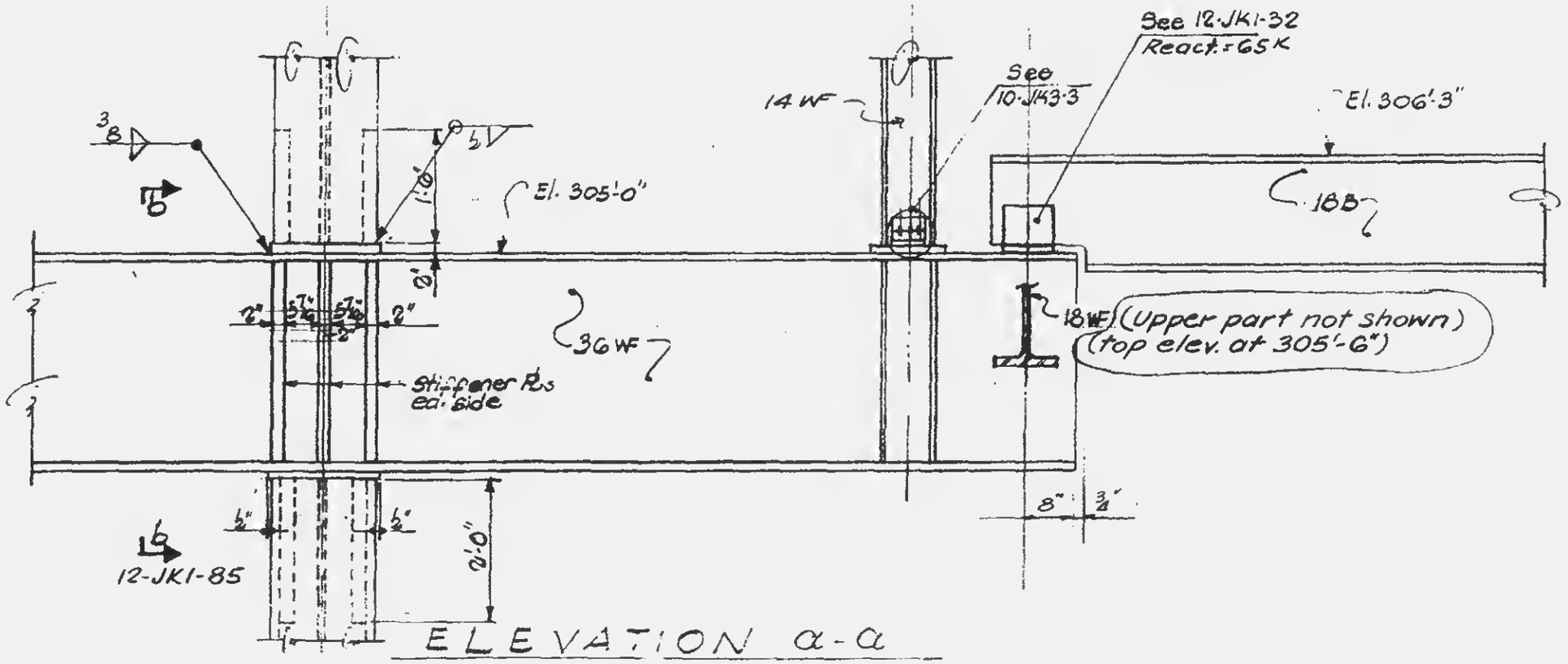
PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAILS | DATE 3-21-69

REVISIONS

5-29-69



PART PLAN AT FL. EL. 310'-0"
Top of steel EL. 305'-0"



ELEVATION a-a

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DESIGNED

DRAWN S.T.M.

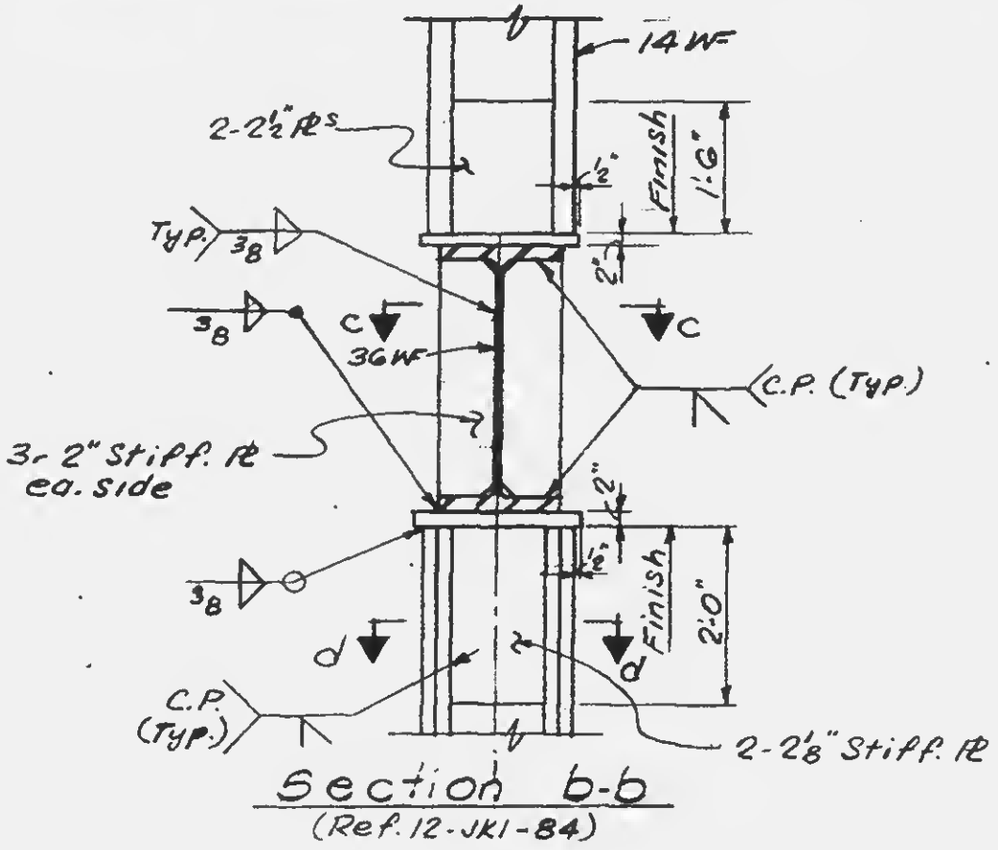
REVIEWED E.L.

12-JK1-84

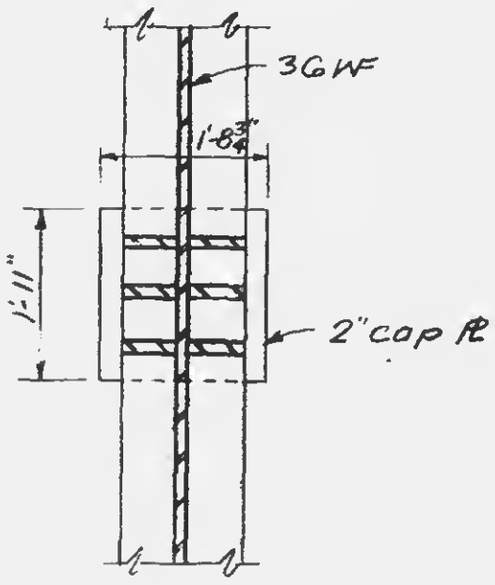
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM CONNECTION DETAILS | DATE: 3-21-69

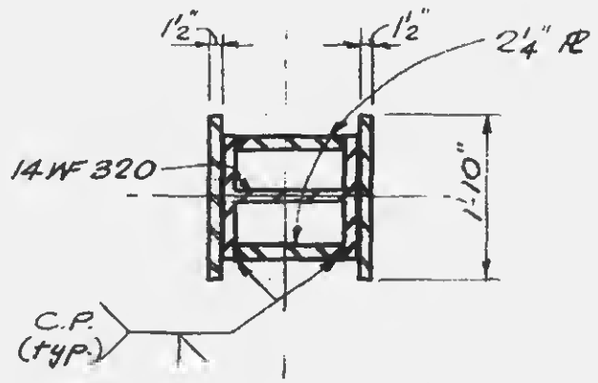
REVISIONS



Section b-b
(Ref. 12-JK1-84)



Section c-c



Section d-d

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DESIGNED

DRAWN
S.T.M.

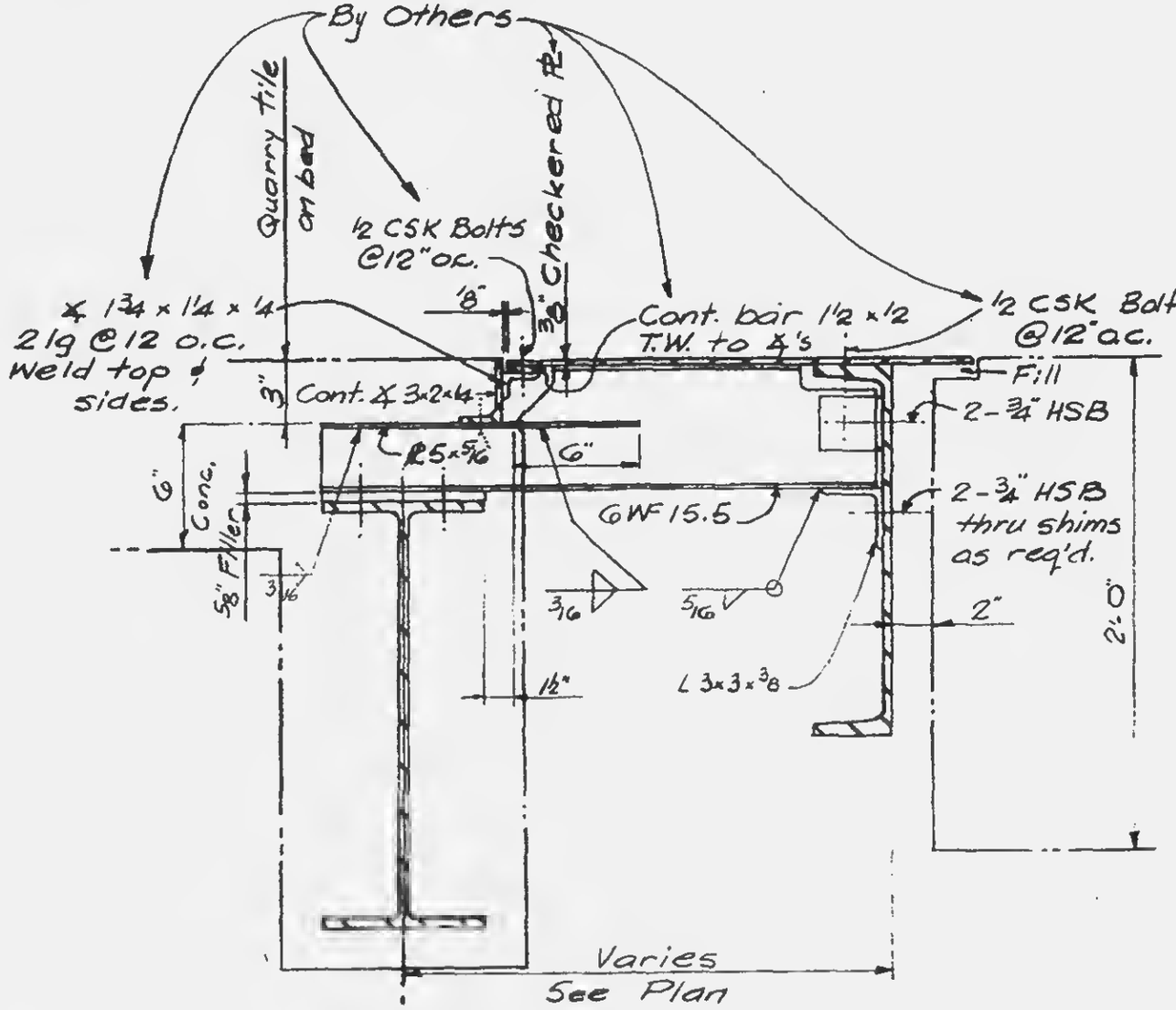
REVIEWED
E.L.

12-JK1-85

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: REFRIG. RM. CONN. DETAILS ADJ. TO 24"MECH. BASE | DATE: 10-15-68

REVISIONS



Work by others shown schematically only.
For full details refer to Archt's and Mech. Engr's dwgs.

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DESIGNED

DRAWN

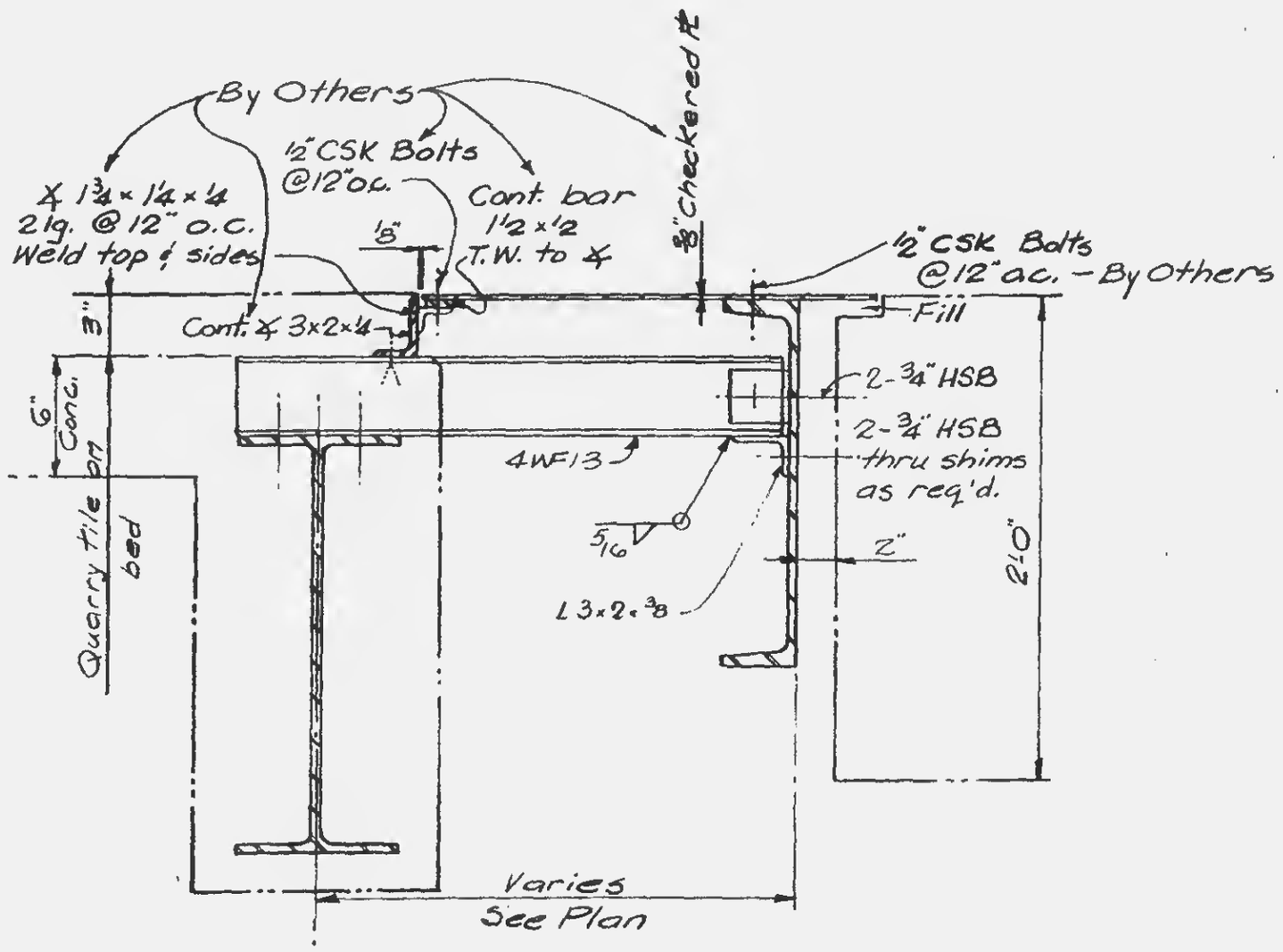
REVIEWED

12-JK1-99

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: REFRIG. EM. CONN. DETAILS ADJ. TO 24" MECH. BASE | DATE: 10-15-68

REVISIONS



Work by others shown schematically only.
For full details refer to Archt's and Mech. Engr's dwgs.

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DESIGNED

DRAWN

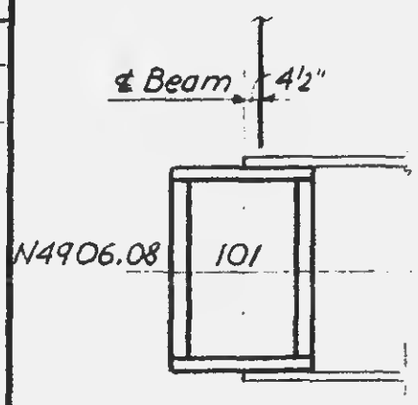
REVIEWED

12-JK1-99A

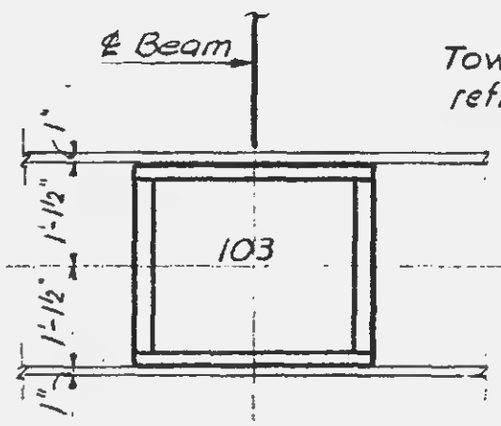
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAIL TO N. OF TOWER 'A' - A101→A108 | DATE 11-24-67

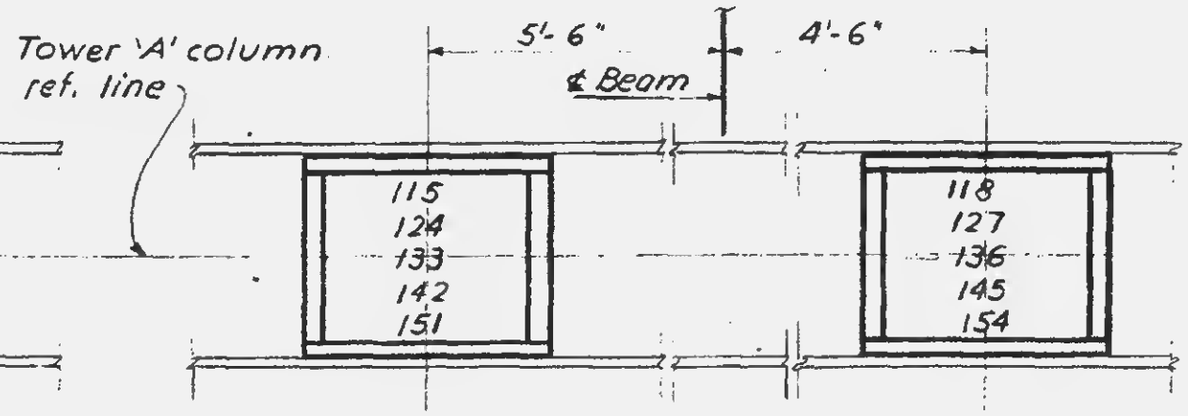
REVISIONS
1-5-68
5-1-68



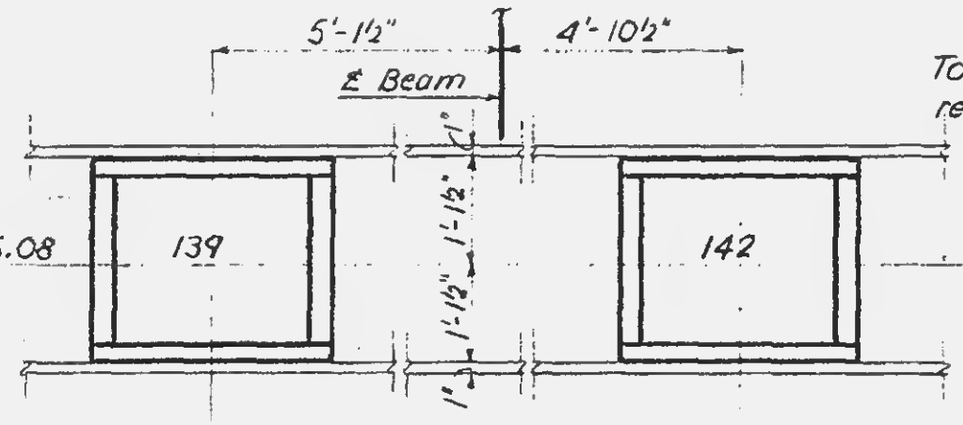
A-101



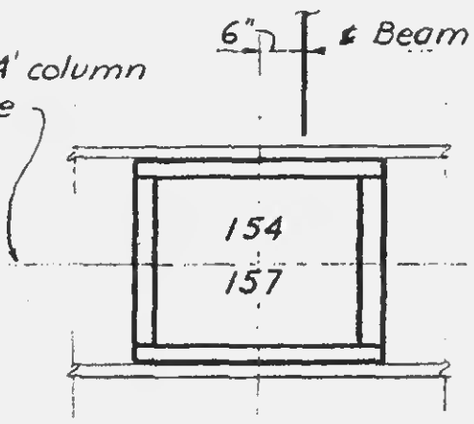
A-102



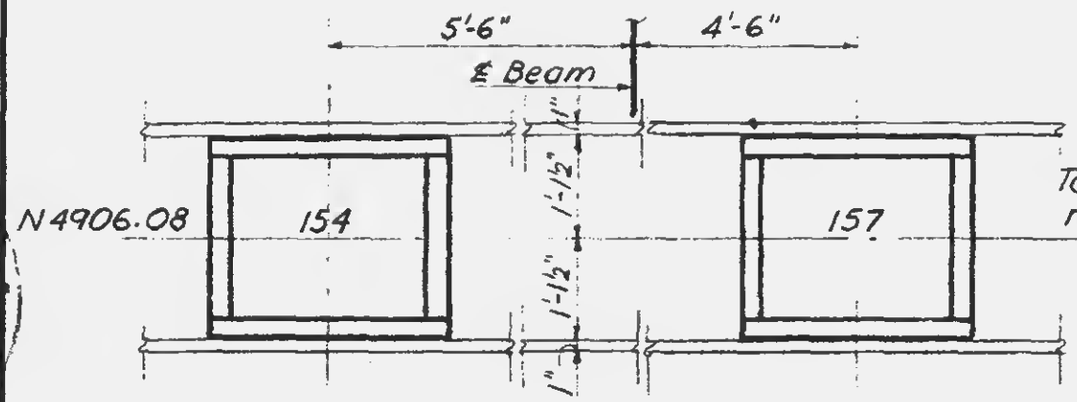
A-103 & A-104



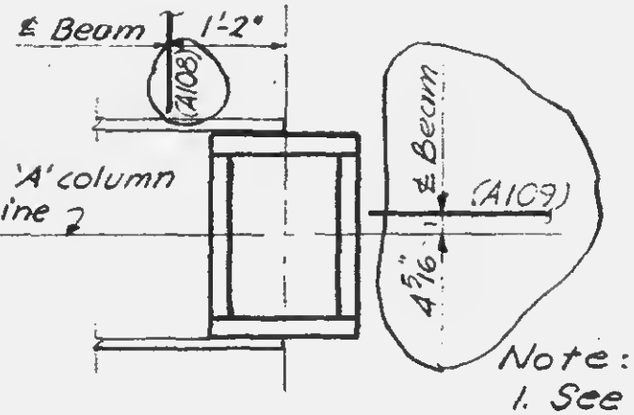
A-105



A-106



A-107



A-108

A-109

N

Note:
1. See schedule on 12-JK1-107

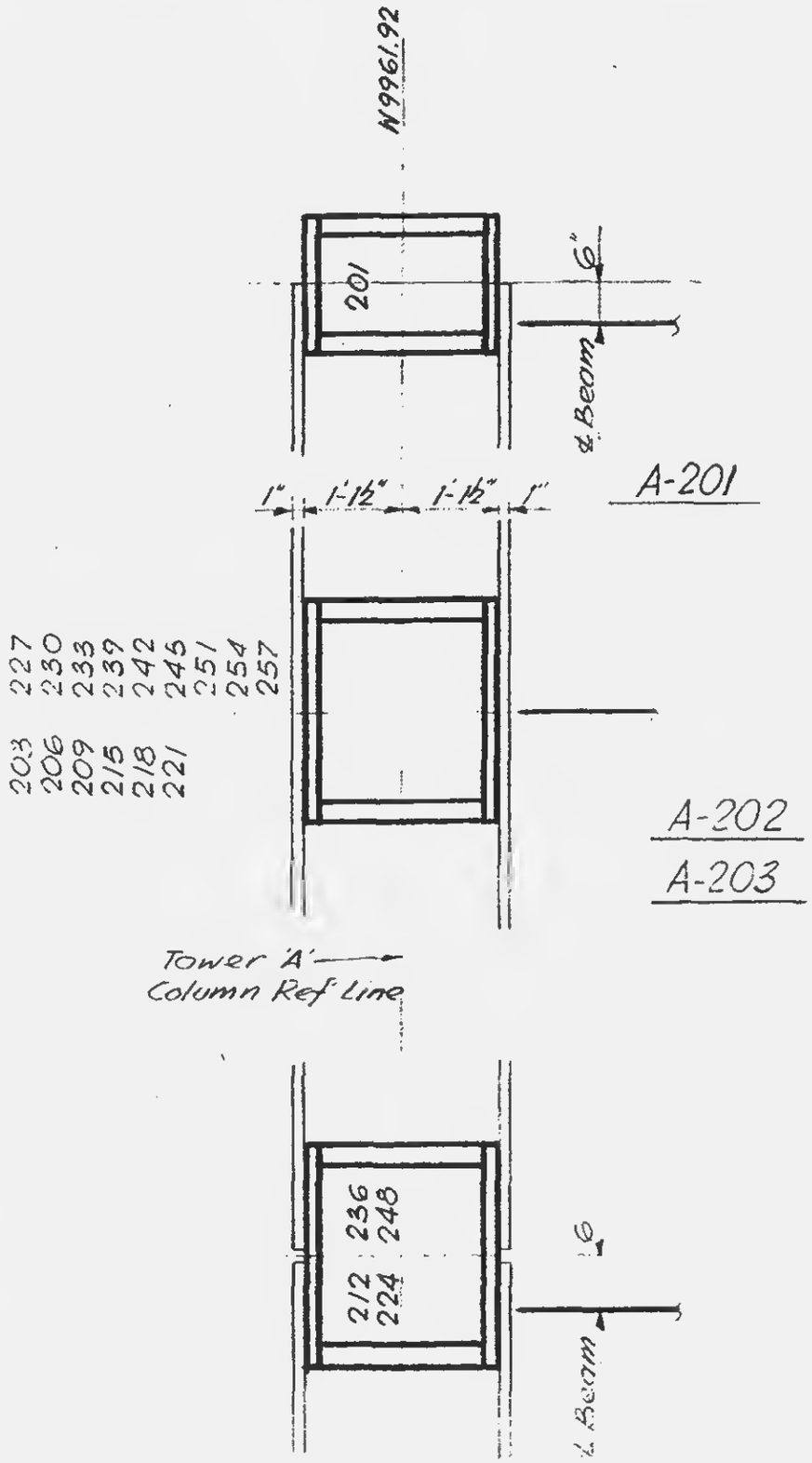
12-JK1-101

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LESLIE E. ROBERTSON
No. 34360
OF THE STATE OF NEW YORK

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PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAIL TO E OF TOWER 'A' A-201-A205 | DATE 5-1-68

REVISIONS

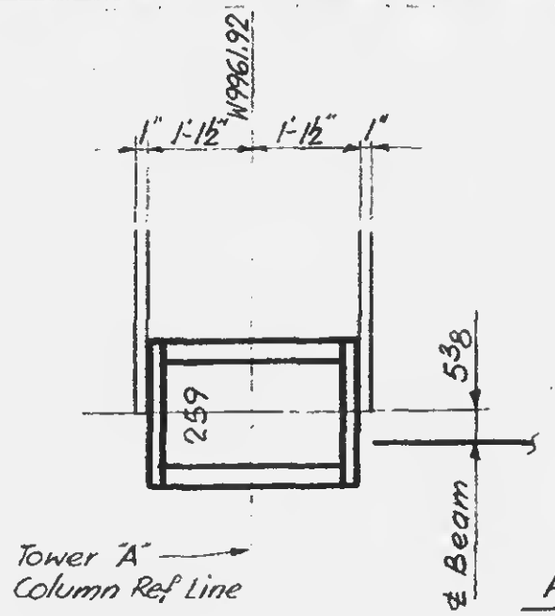


A-201

A-202

A-203

A-204



A-205

Note:
See Schedule on 12-JK1-107

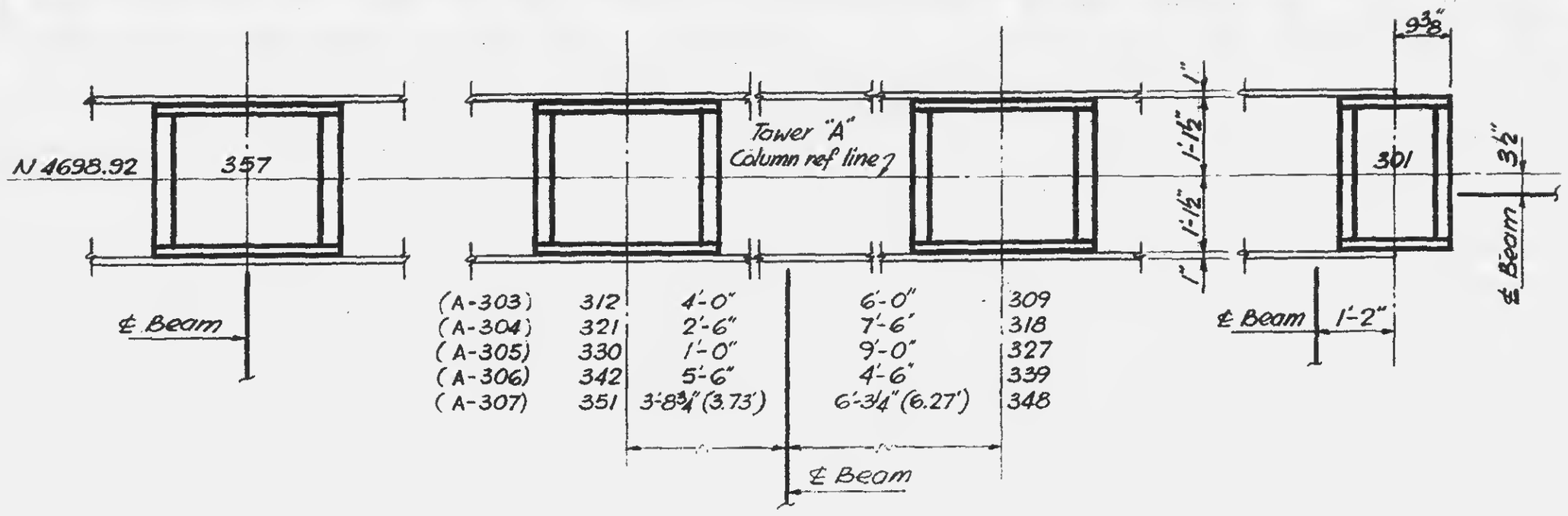
12-JK1-102

LICENSED PROFESSIONAL ENGINEER
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No. 34360
STATE OF NEW YORK
UNIVERSITY OF THE STATE OF NEW

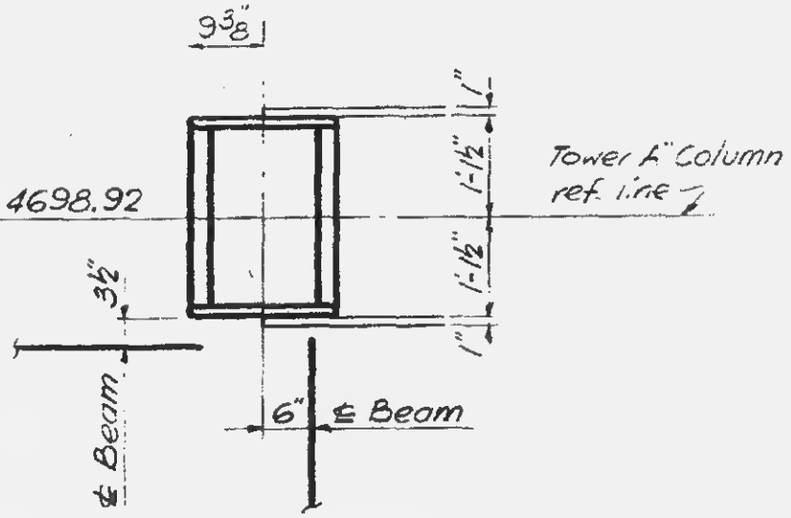
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — STRUCTURAL ENGINEERS

PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAIL TO S. 0" TOWER A" A301 THRU A310 | DATE N-24-67

REVISIONS



A-308 | A-303 Thru A-307 | A-301 & A-302



A-309 & A-310

Note:
1. See Schedule on 12-JK1-108

N

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12-JK1-103

SKILLING, HELLE, CHRISTIANSEN & ROBERTSON — STRUCTURAL & CIVIL ENGINEERS

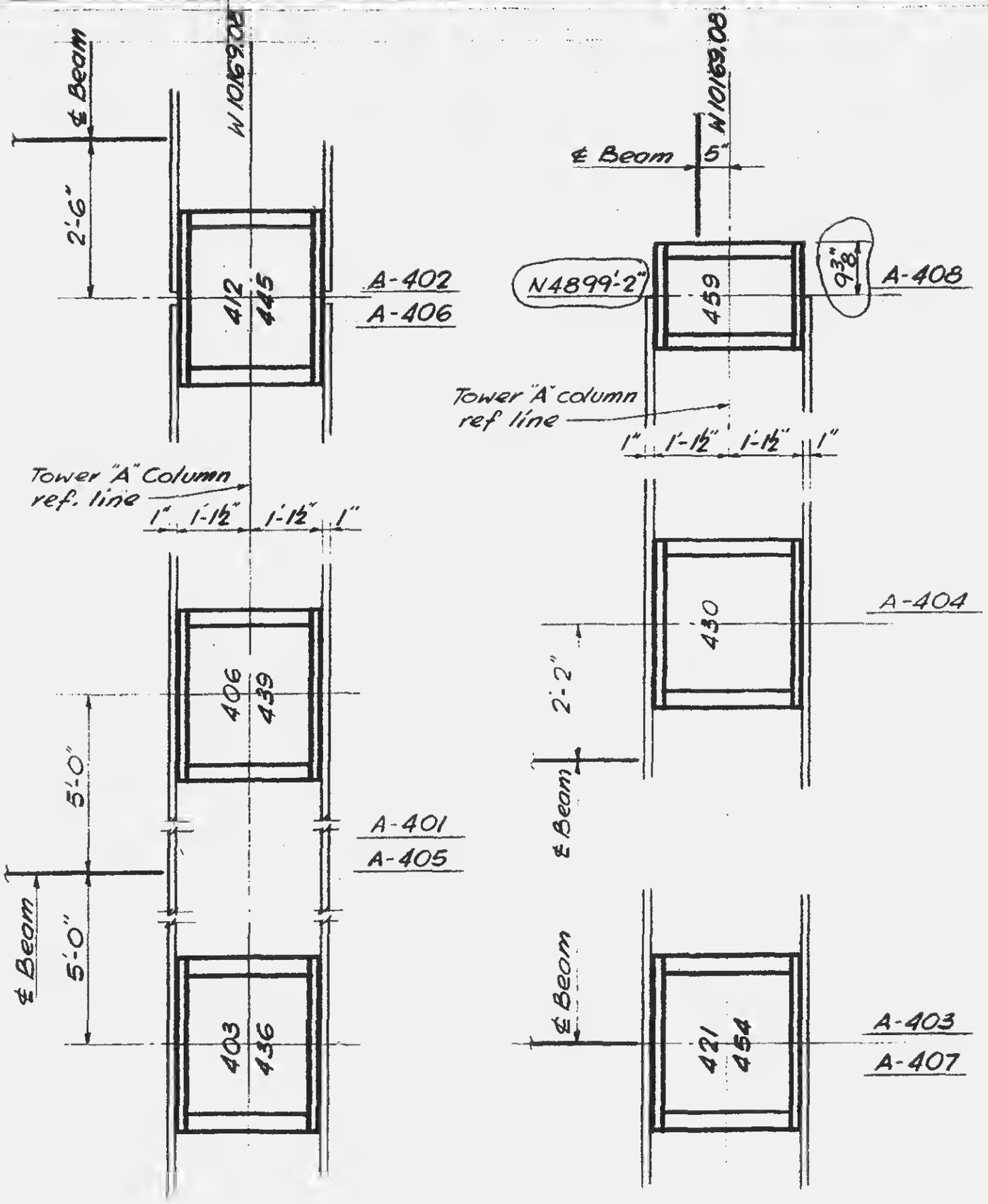
PROJECT THE WORLD TRADE CENTER

TITLE BEAM CONNECTION DETAIL TO W. OF TOWER "A" - 4401 THRU 1408

DATE 11-24-67

REVISIONS

1-5-68



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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

Note:
1. See Schedule on 12-JK1-108

12-JK1-104

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

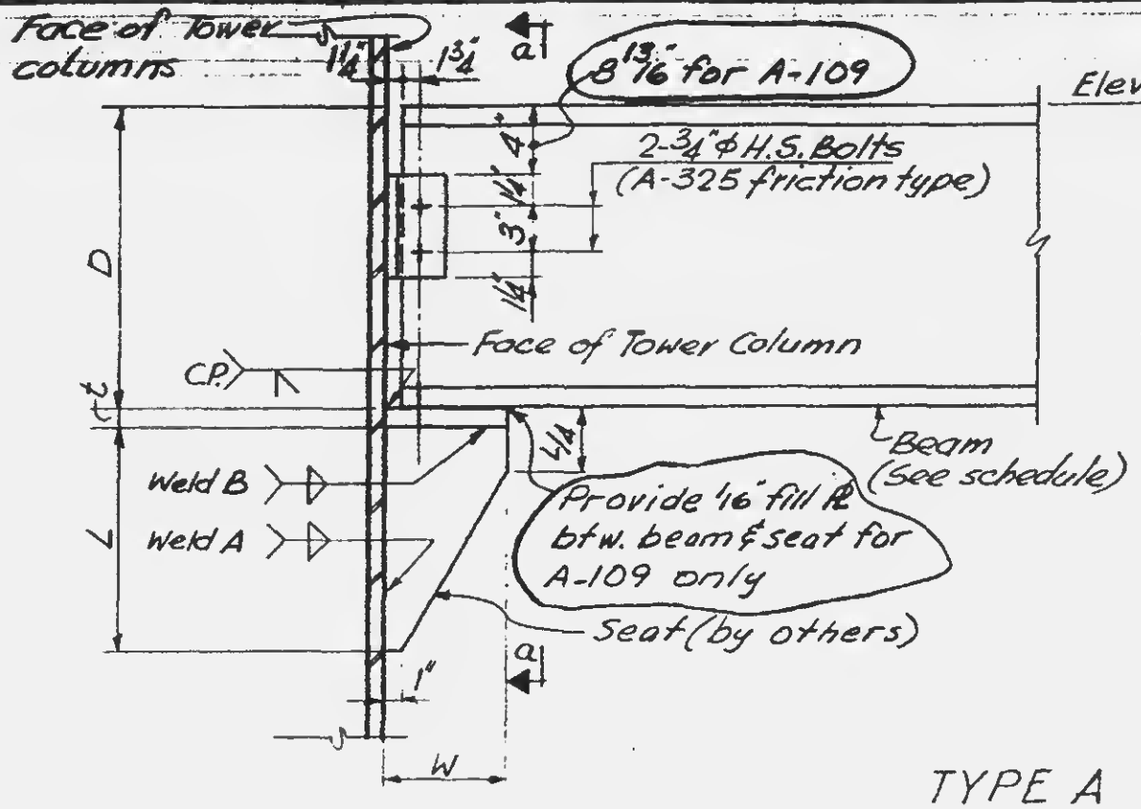
PROJECT

TITLE: BEAM CONNECTION DETAIL TO TOWER TYP. ALL

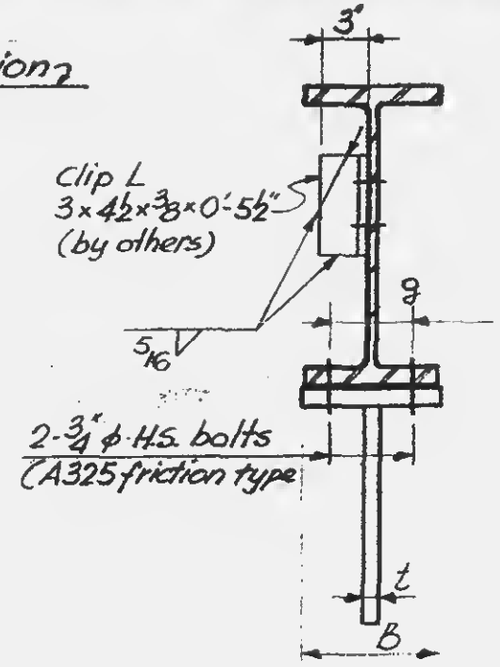
DATE: 5-1-68

REVISIONS

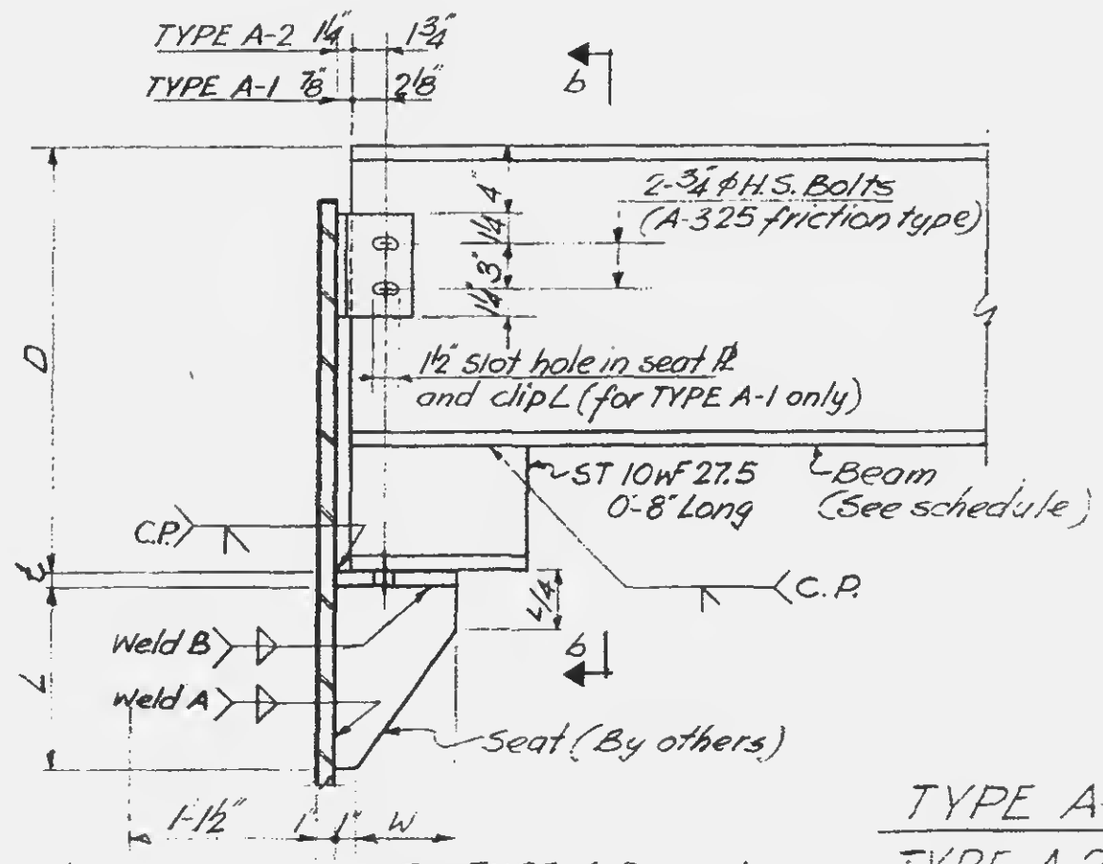
12-3-68



TYPE A

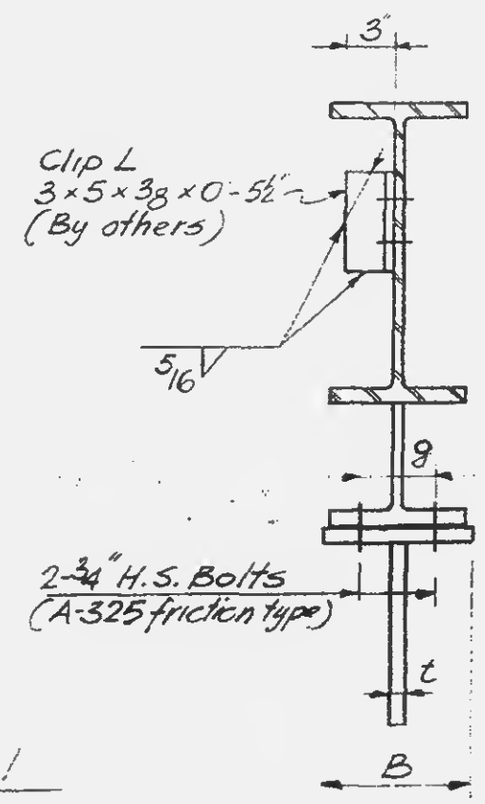


Section a-a



TYPE A-1

TYPE A-2 (No slot holes)



Section b-b

Note:
1. Provide 1¾" × 7/16 washers (Fy=50 PSI) sq. or round where slot holes occurs.
2. See Schedule 12-JK1-107 & 108 for locations

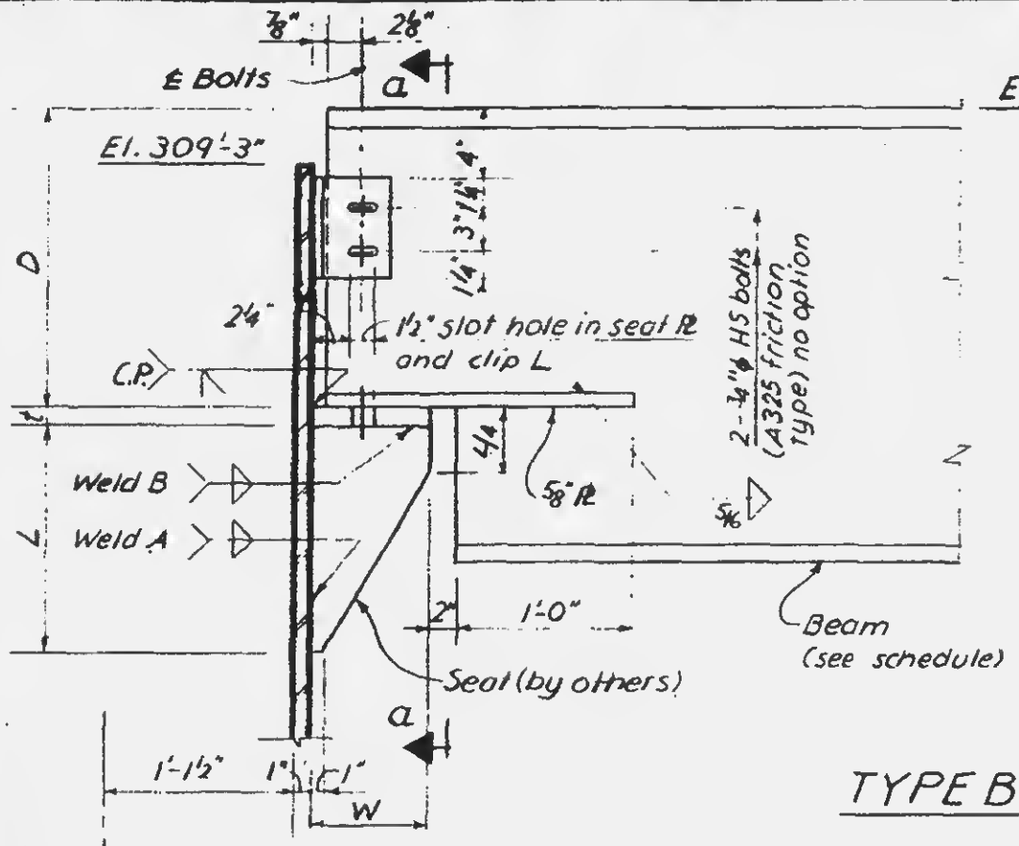
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34260
UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-105

SKILLING - HELLE - [illegible] - ROBERTSON Structural & Civil Engineers

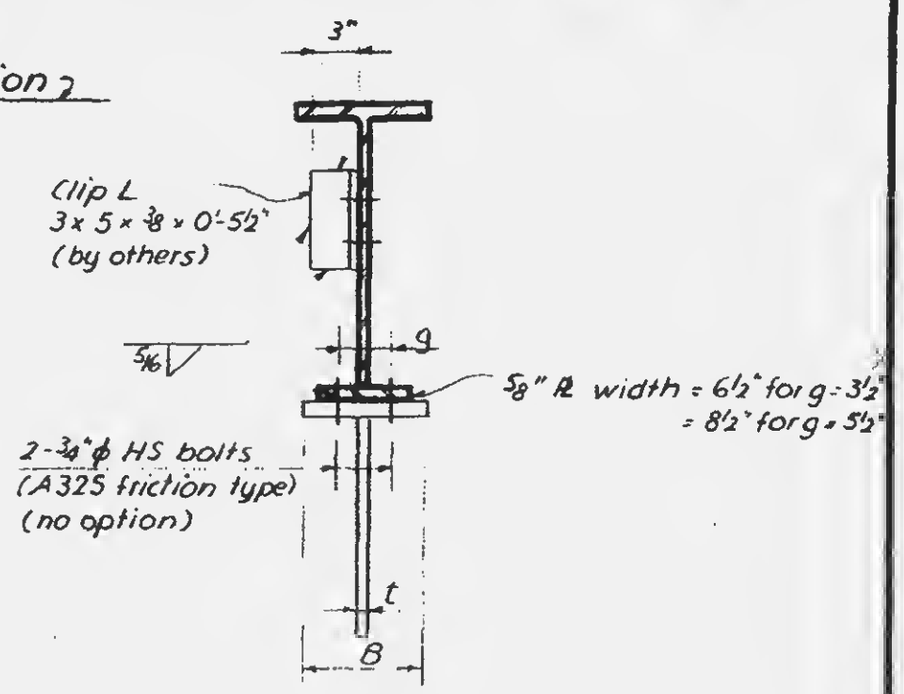
PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAIL TO TOWER - TYPE B & C | DATE 11-24-67

REVISIONS
1-5-68

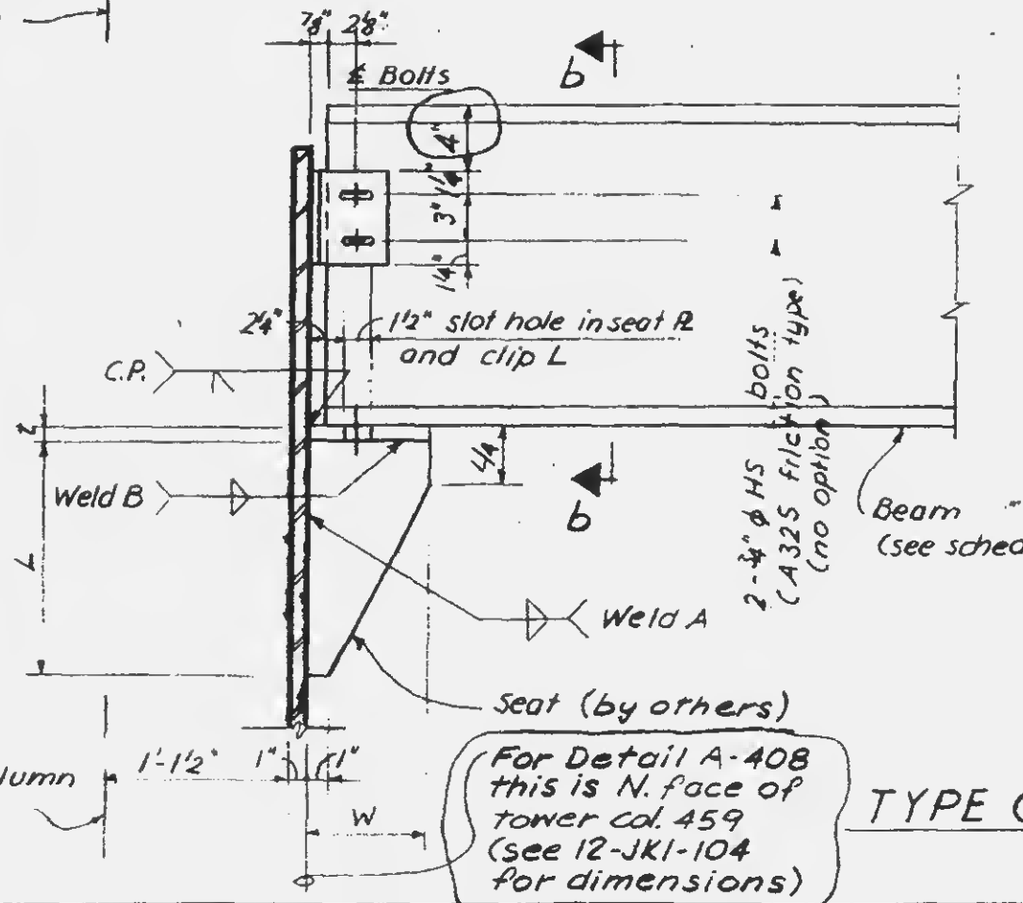


TYPE B

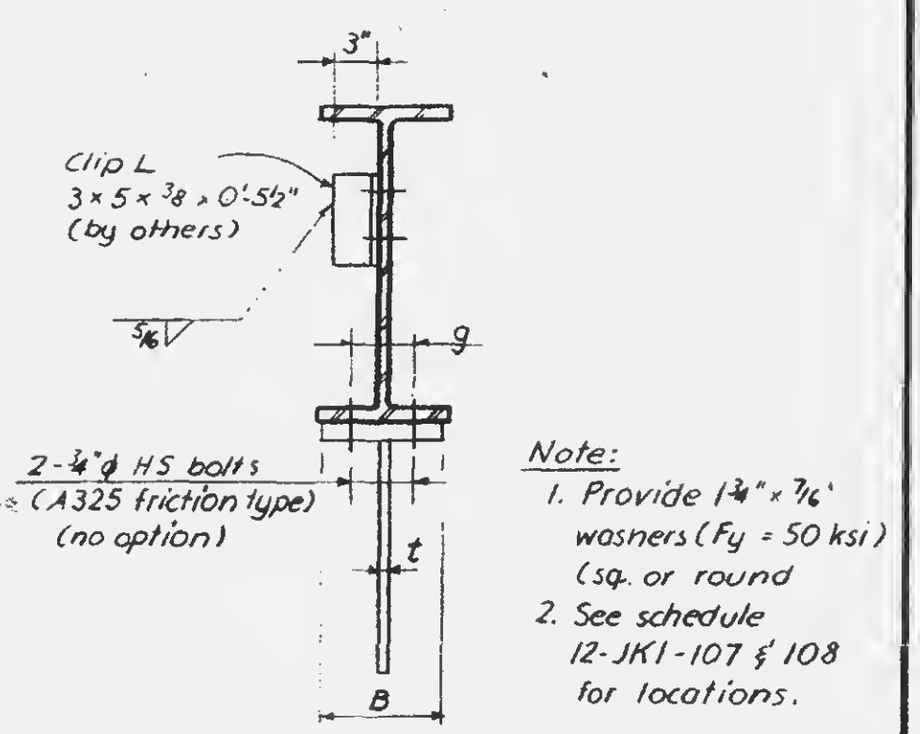
Elevation 2



Section a-a



TYPE C



Section b-b

Note:
1. Provide 1 3/4" x 7/16" washers (Fy = 50 ksi) (sq. or round
2. See schedule 12-JK1-107 & 108 for locations.

LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON UNIVERSITY OF THE STATE OF NEW YORK No. 34360

12-JK1-106

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE SCHEDULE FOR BEAM CONNECTION TO TOWER 'A' | DATE 11-24-67

REVISIONS

5-1-68

12-3-68

DETAIL No.	BEAM			CONNECTION									g
				TYPE	SEAT ℄			STIFFENER ℄			WELD SIZE		
	SIZE	ELEV.	D		W	t	B	W	t	L	A	B	
A-101	14 WF 30	308'-3"		C	8"	1/2"	6 1/2"	8"	1/2"	15"	5/16	5/16	3 1/2"
A-102	14 WF 34	308'-8 3/4"		C	8"	1/2"	6 1/2"	8"	1/2"	15"	5/16	5/16	3 1/2"
A-103	21 B 49	309'-6"		C	6"	9/16"	6 1/2"	6"	9/16"	12"	5/16	5/16	3 1/2"
A-104				(See 12-JK1-109 for detail)									
A-105	21 B 49	309'-6"		C	6"	1/2"	6 1/2"	6"	1/2"	13"	5/16	5/16	3 1/2"
A-106	21 WF 96	309'-6"		C	5"	9/16"	8 1/2"	5"	9/16"	10"	5/16	5/16	5 1/2"
A-107	21 WF 96	309'-6"		C	5"	9/16"	8 1/2"	5"	9/16"	10"	5/16	5/16	5 1/2"
A-108	21 WF 96	309'-6"		C	5"	9/16"	8 1/2"	5"	9/16"	10"	5/16	5/16	5 1/2"
A-109	21 B 44	309'-5 15/16"		A	7"	1/2"	6 1/2"	7"	1/2"	12"	5/16	5/16	3 1/2"
* A-201	16 WF 36	309'-1"		C	6"	1/2"	6 1/2"	6"	1/2"	12"	5/16	5/16	3 1/2"
A-202	16 WF 36	309'-1"		C	6"	1/2"	6 1/2"	6"	1/2"	12"	5/16	5/16	3 1/2"
A-203	16 WF 36	309'-1"	20 3/4"	A-1	6"	1/2"	8 1/2"	6"	1/2"	12"	5/16	5/16	5 1/2"
A-204	16 WF 36	309'-1"	20 3/4"	A-1	6"	1/2"	8 1/2"	6"	1/2"	12"	5/16	5/16	5 1/2"
A-205	16 WF 36	309'-1"	20 3/4"	A-2	6"	1/2"	8 1/2"	6"	1/2"	12"	5/16	5/16	5 1/2"

NOTE:-

1. See dwg 12-JK1-105 & 106 for detail of connection.
2. * — Provide type C seat connection & clip L as shown on 12-JK1-106 and field weld to tower spandrel ℄.

LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON No. 34360 UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-107

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — STRUCTURAL CIVIL ENGINEERS

PROJECT: THE WORLD TRADE CENTER | TITLE: SCHEDULE FOR BEAM CONNECTION TO TOWER A | DATE: 11-21-67

REVISIONS
1-5-68
5-1-68

DETAIL No.	BEAM			CONNECTION										g
				TYPE	SEAT ℄			STIFFENER ℄			WELD SIZE			
	SIZE	ELEV.	D		W	t	B	W	t	L	A	B		
A-301	16WF36	309'-3"		C	7"	1/2"	6 1/2"	7"	1/2"	13"	5/16"	5/16"	3 1/2"	
A-302	30WF99	309'-3"	1'-8"	B	8	3/4	8 1/2	8	3/4	19	3/8	3/8	5 1/2	
A-303	30WF99	309'-3"	1'-8"	B	9	3/4	8 1/2	9	3/4	18	1/2	1/2	5 1/2	
A-304	30WF99	309'-3"	1'-8"	B	9	3/4	8 1/2	9	3/4	18	1/2	1/2	5 1/2	
A-305	30WF108	309'-3"	1'-8"	B	10	3/4	9	10	3/4	20	1/2	1/2	5 1/2	
A-306	30WF99	309'-3"	1'-8"	B	10	3/4	9	10	3/4	20	1/2	1/2	5 1/2	
A-307	30WF172	309'-3"	1'-8"	B	8	15/16	9	8	15/16	20	3/8	3/8	5 1/2	
A-308	33WF141	308'-8"		C	5	7/8	8 1/2	5	7/8	15	5/16	5/16	5 1/2	
A-309	16WF45	308'-4"		C	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2	
A-310				(See 12-JK1-110 for detail)										
A-401	18WF55	307'-5"		C	5	9/16	6 1/2	5	9/16	11	5/16	5/16	3 1/2	
A-402	24B55	307'-11"		C	↑	↑	↑	↑	↑	↑	↑	↑	↑	
A-403	18WF55	307'-11"		C										
A-404	↑	307'-11"		C										
A-405		308'-1"		C										
A-406	↓	308'-1"		C	↓	↓	↓	↓	↓	↓			↓	
A-407	18WF55	308'-3"		C	5	9/16	6 1/2	5	9/16	11	↓	↓	3 1/2	
A-408	36WF135	308'-3"		C	7	7/8	9	7	7/8	20	5/16	5/16	5 1/2	

NOTE:-

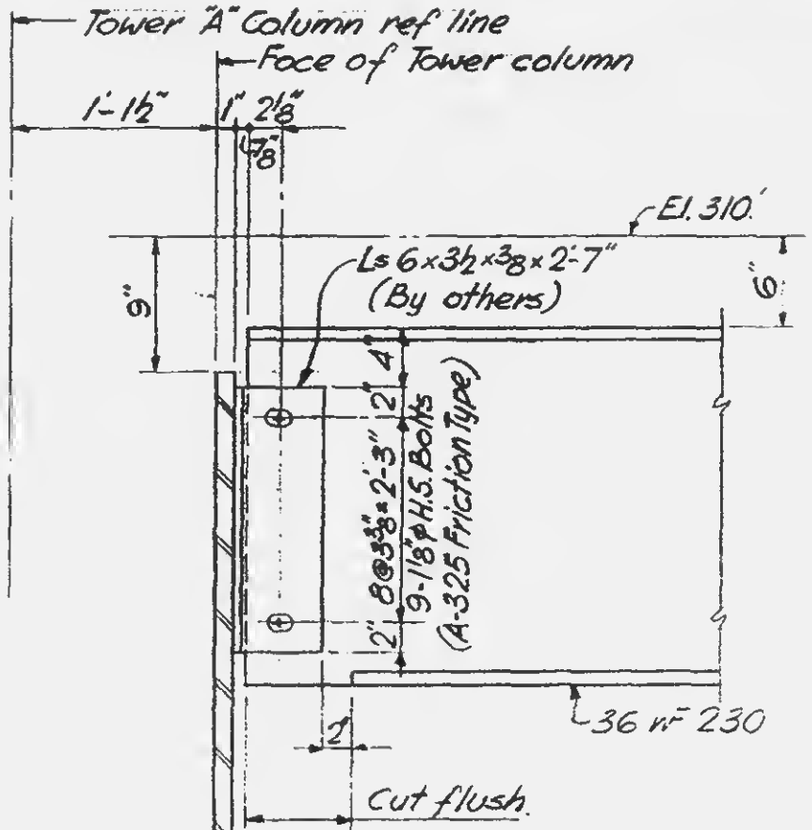
1. See dwg 12-JK1-105&106 for detail of connection.

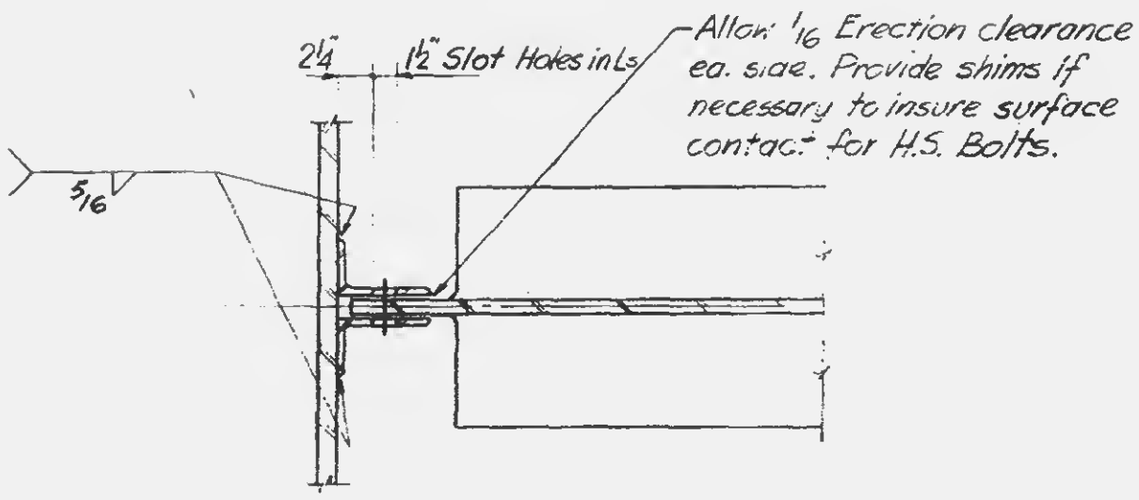
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-108

REVISIONS

12-3-68





Note:
1. Provide 2½ × ⅝ washers (sq. or round) with Fy=50 ksi.

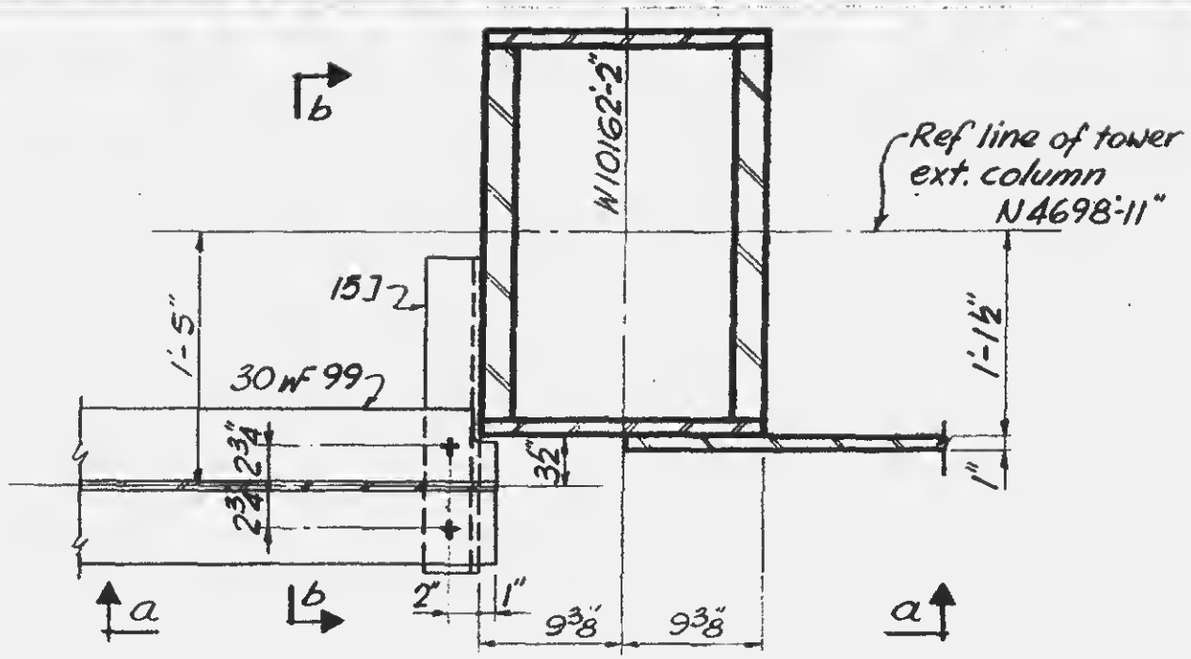
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 24360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-109

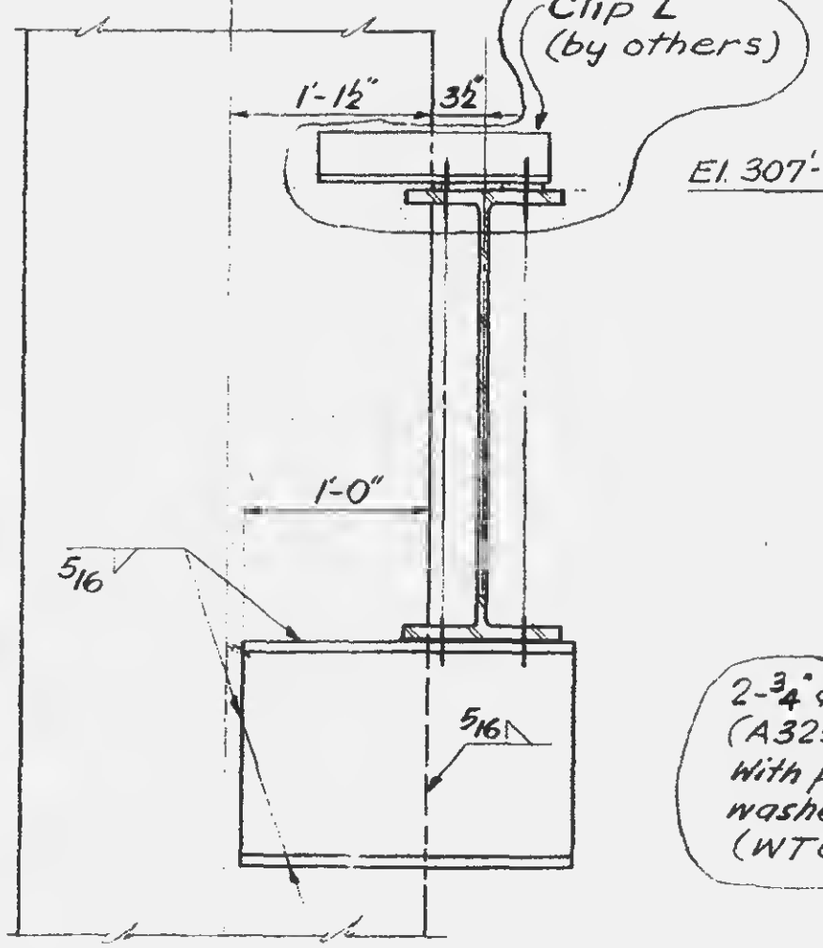
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON

PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION TO TOWER A — A-310 | 11-24-67

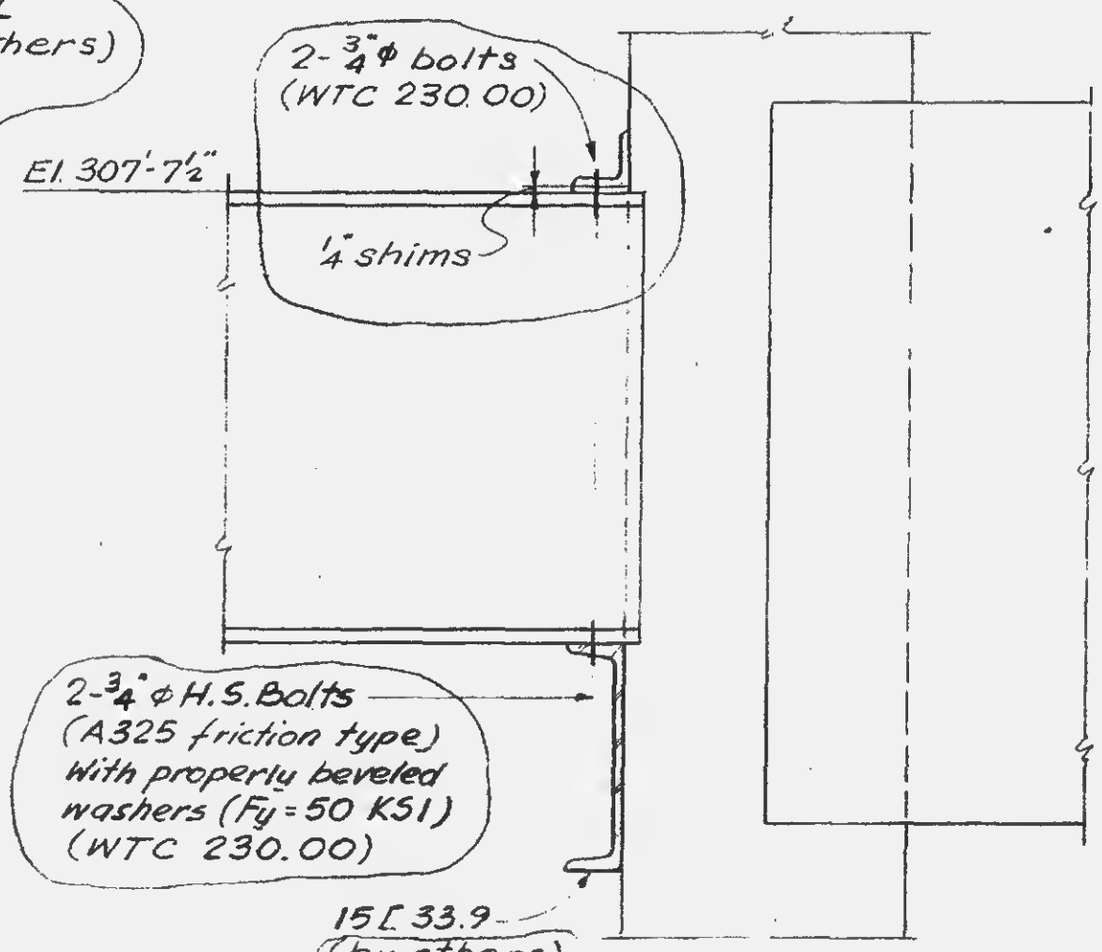
REVISIONS
1-5-68



PLAN



Section b-b



Section a-a

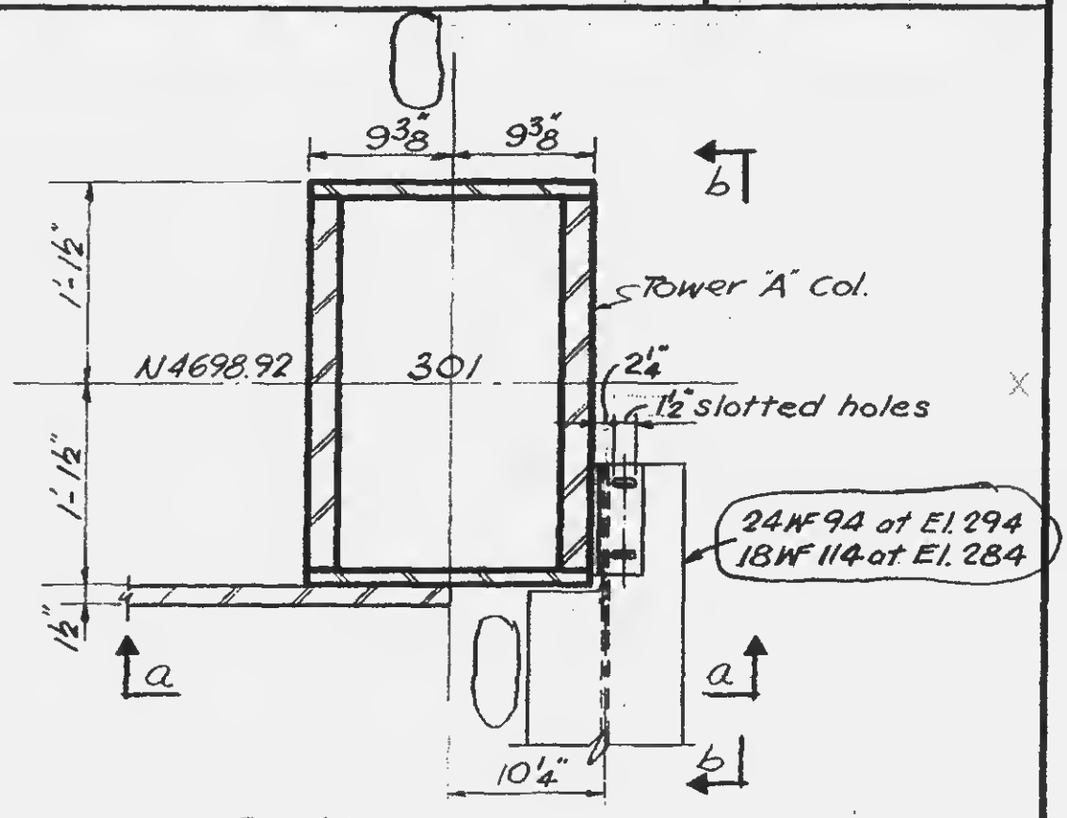
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-110

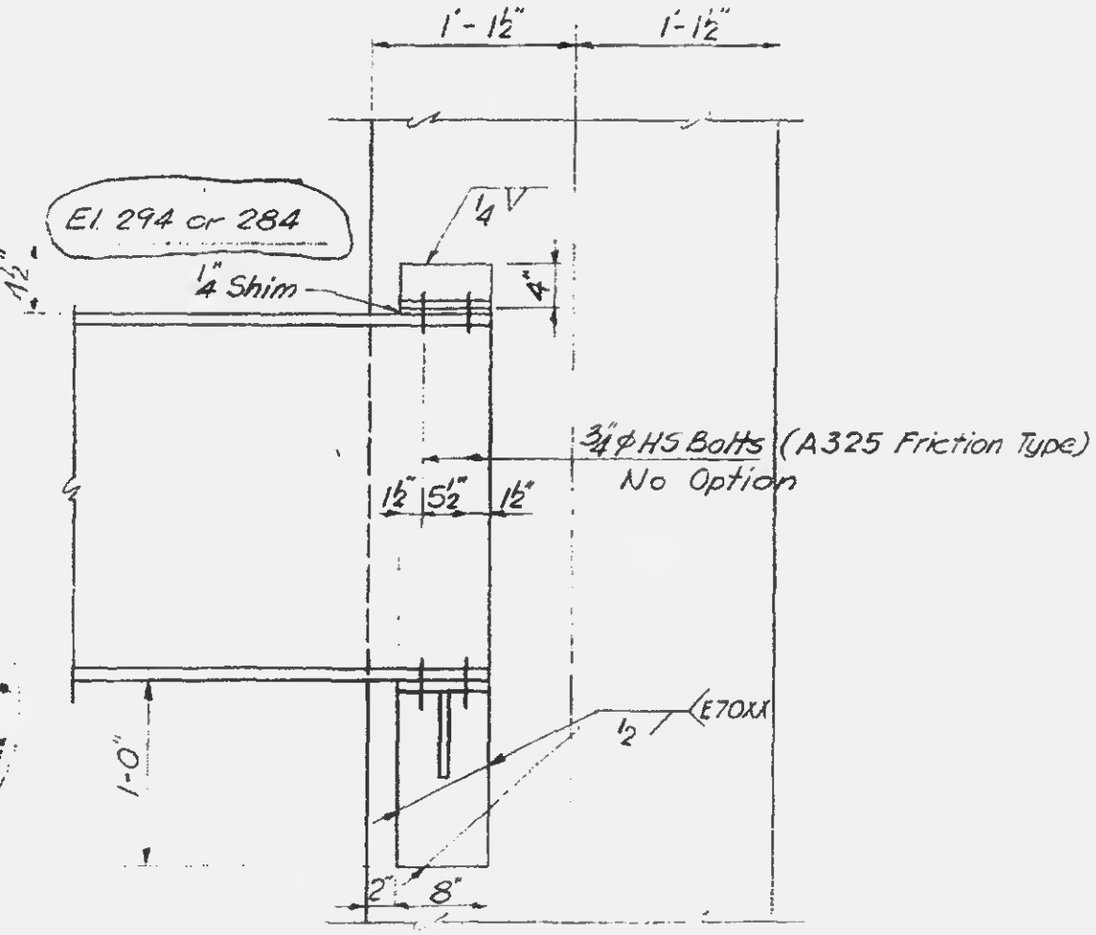
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION TO TOWER "A" | DATE 11-24-67

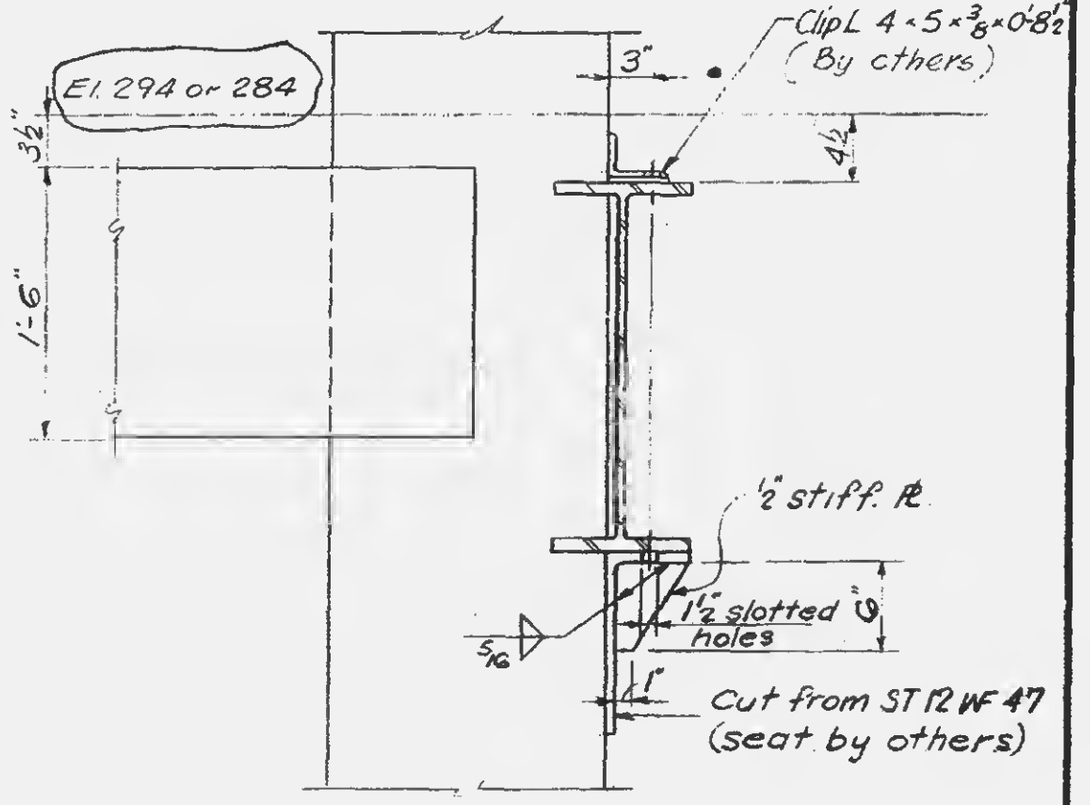
REVISIONS
1-10-68
6-28-68



PLAN



Section b-b



Section a-a

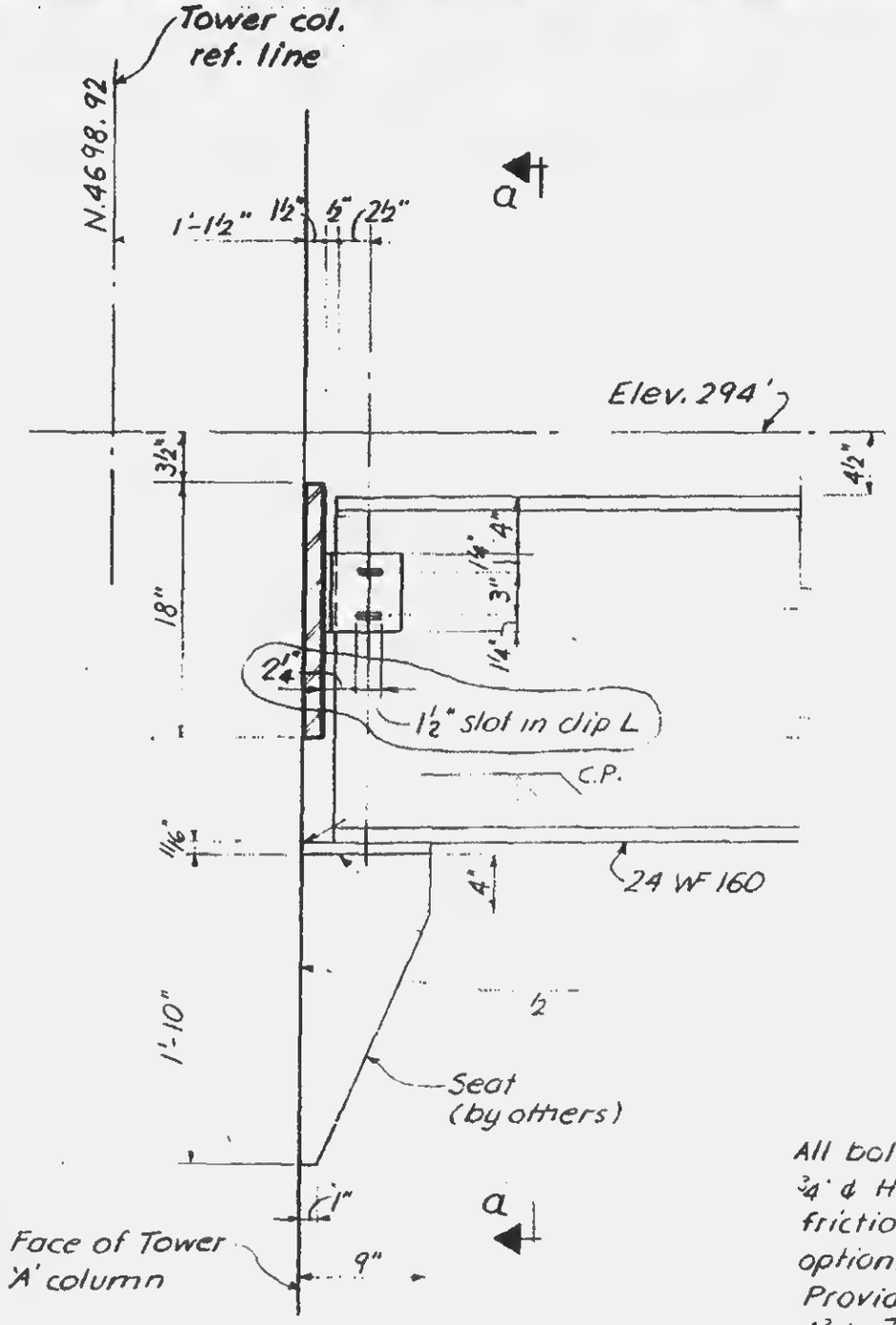
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-J.K.-111

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

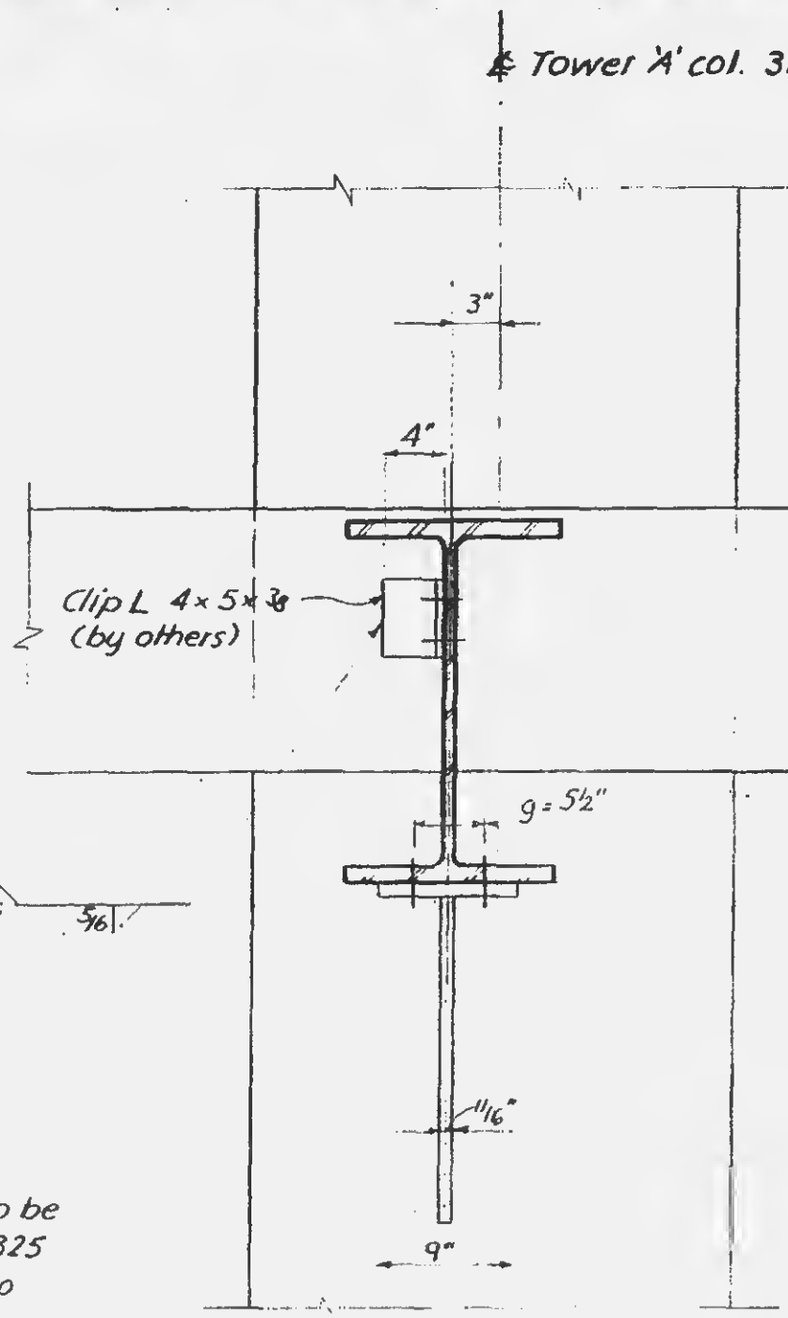
PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF BEAM CONNECTION TO TOWER 'A' | DATE: 11-24-67

REVISIONS
1-5-68



Elevation

All bolts shown to be ¾" ϕ HS bolts (A325 friction type) (no option)
Provide washers 1¼" x 7/16 (sq. or round) with Fy - 50 Ksi.



Section a-a



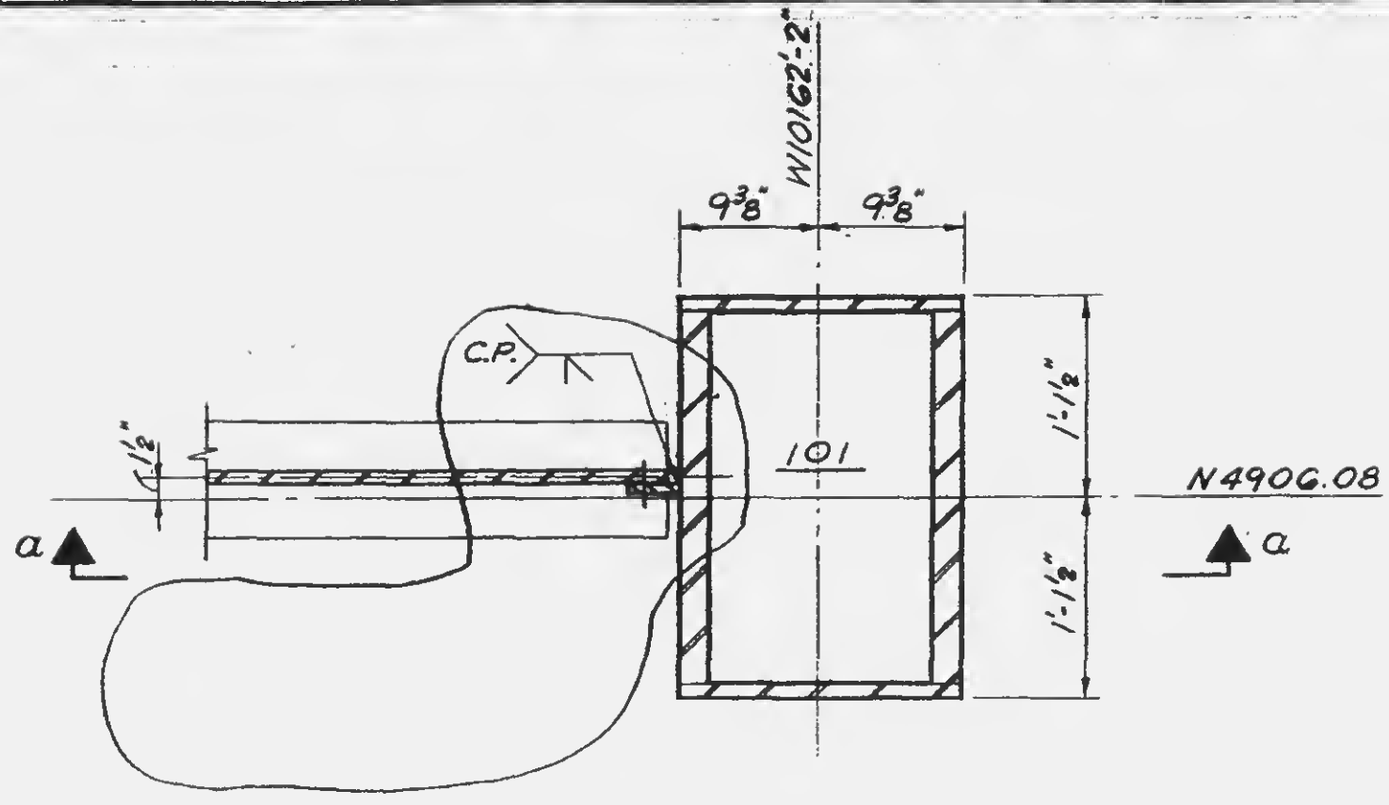
12-JK1-112

SKILLING, HELLE, CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

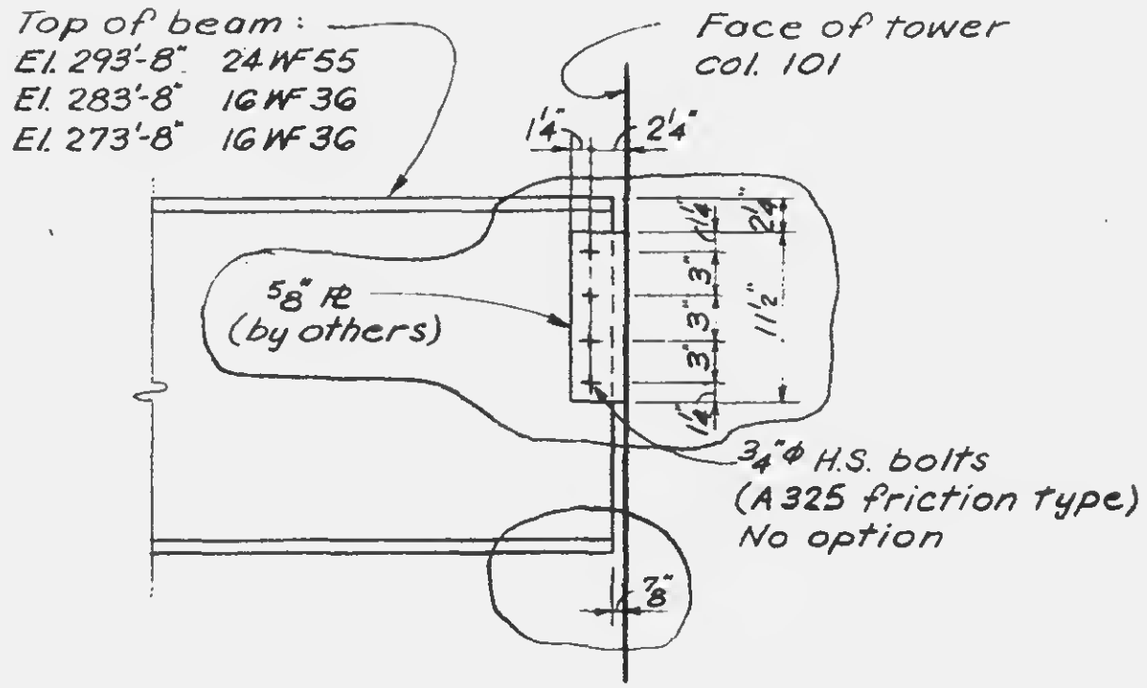
PROJECT: THE WORLD TRADE CENTER — TITLE: DETAIL OF BEAM CONNECTION TO TOWER 'A' — DATE: 1-5-68

REVISIONS

1-10-68



PLAN



Section a-a

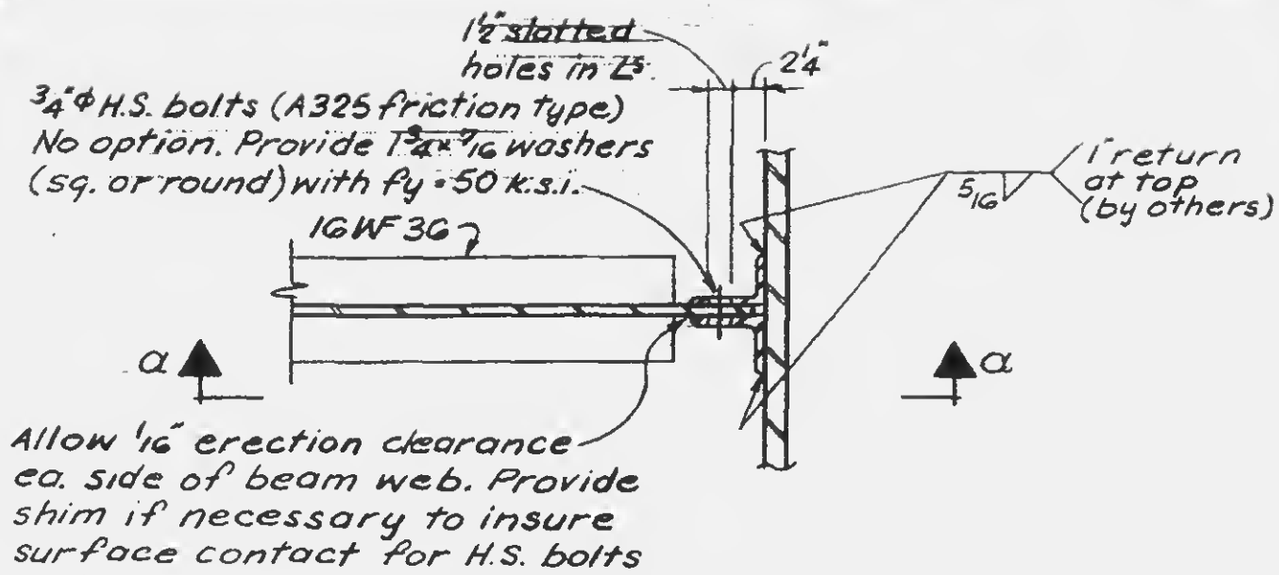
LESLIE E. ROBERTSON

12-JK1-113

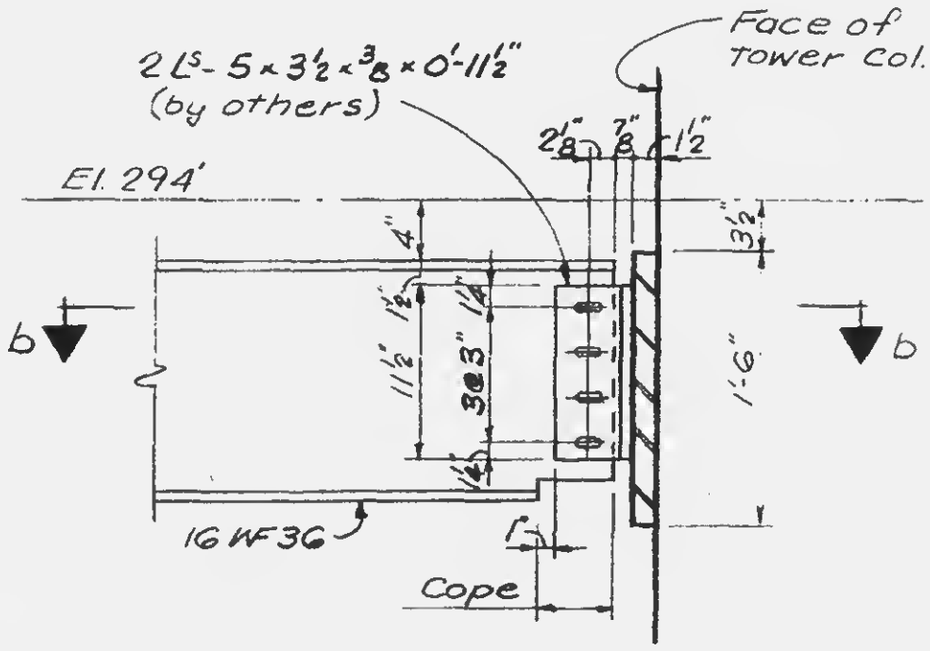
SKILLING [redacted] ON Structural & Civil Engineers

PROJECT THE WORLD TR[redacted]ER | TITLE DETAIL OF BEAM CONNECTION TO TOWER 'A' | DATE 1-5-08

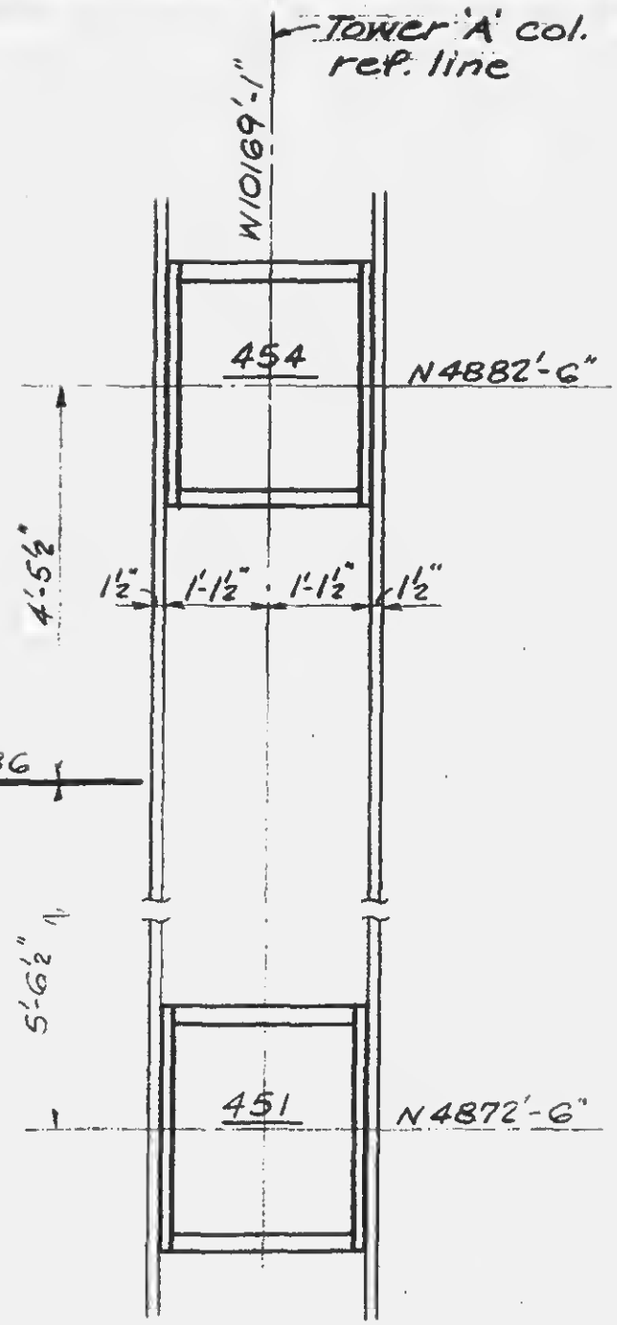
REVISIONS



Section b-b



Section a-a



Location of beam

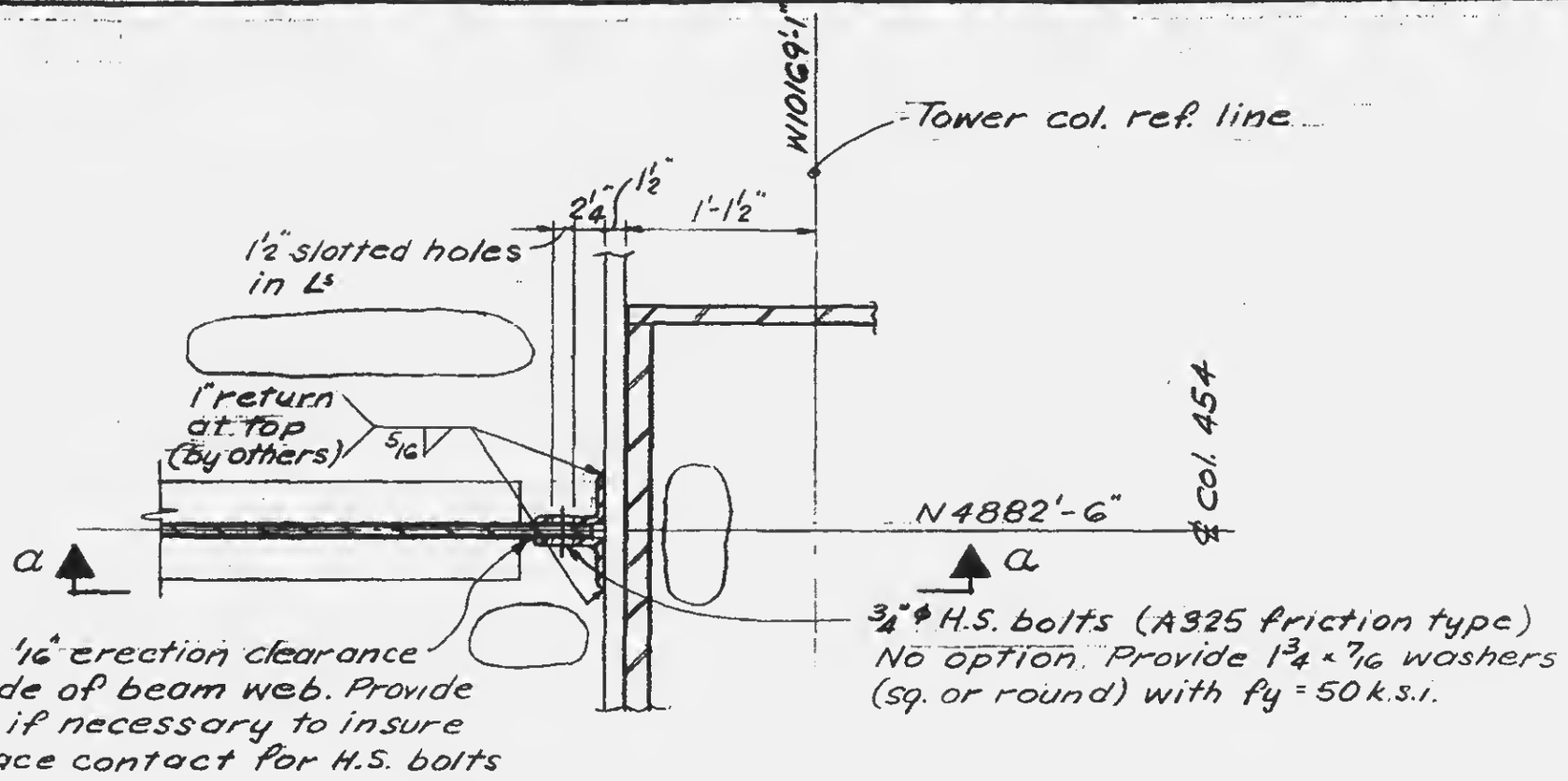


12-JK1-114

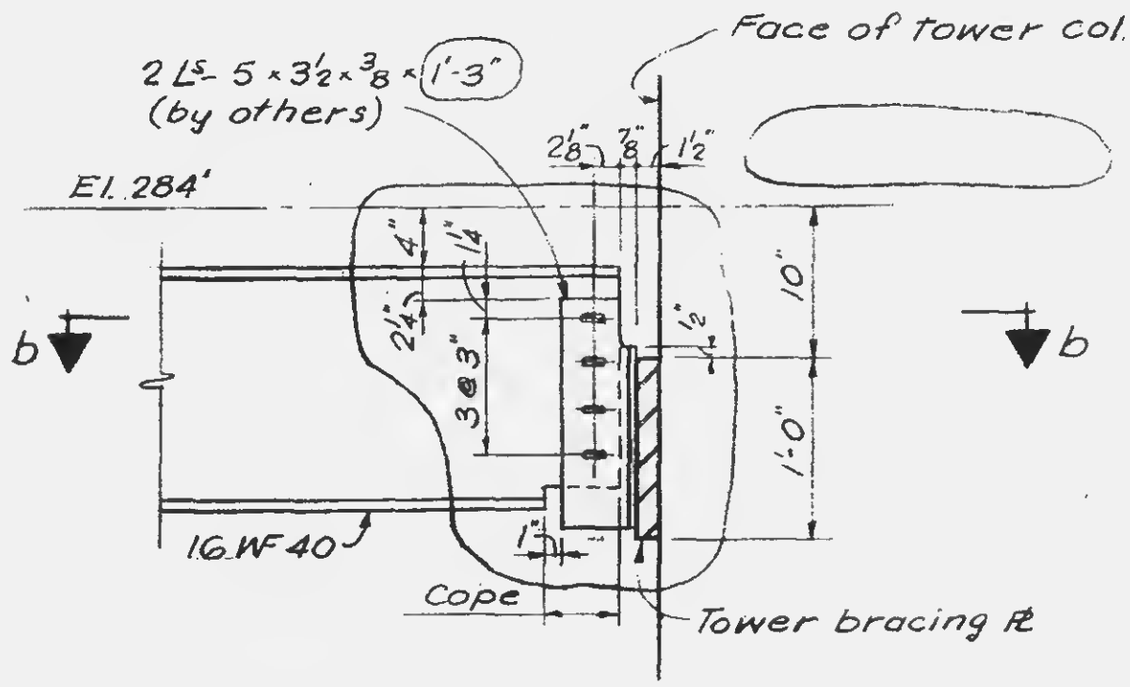
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT [redacted] CENTER | TITLE DETAIL OF BEAM CONNECTION TO TOWER A | DATE 1-5-68

REVISIONS
1-10-68



Section b-b



Section a-a

LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON No. 34980 UNIVERSITY OF THE STATE OF NEW YORK

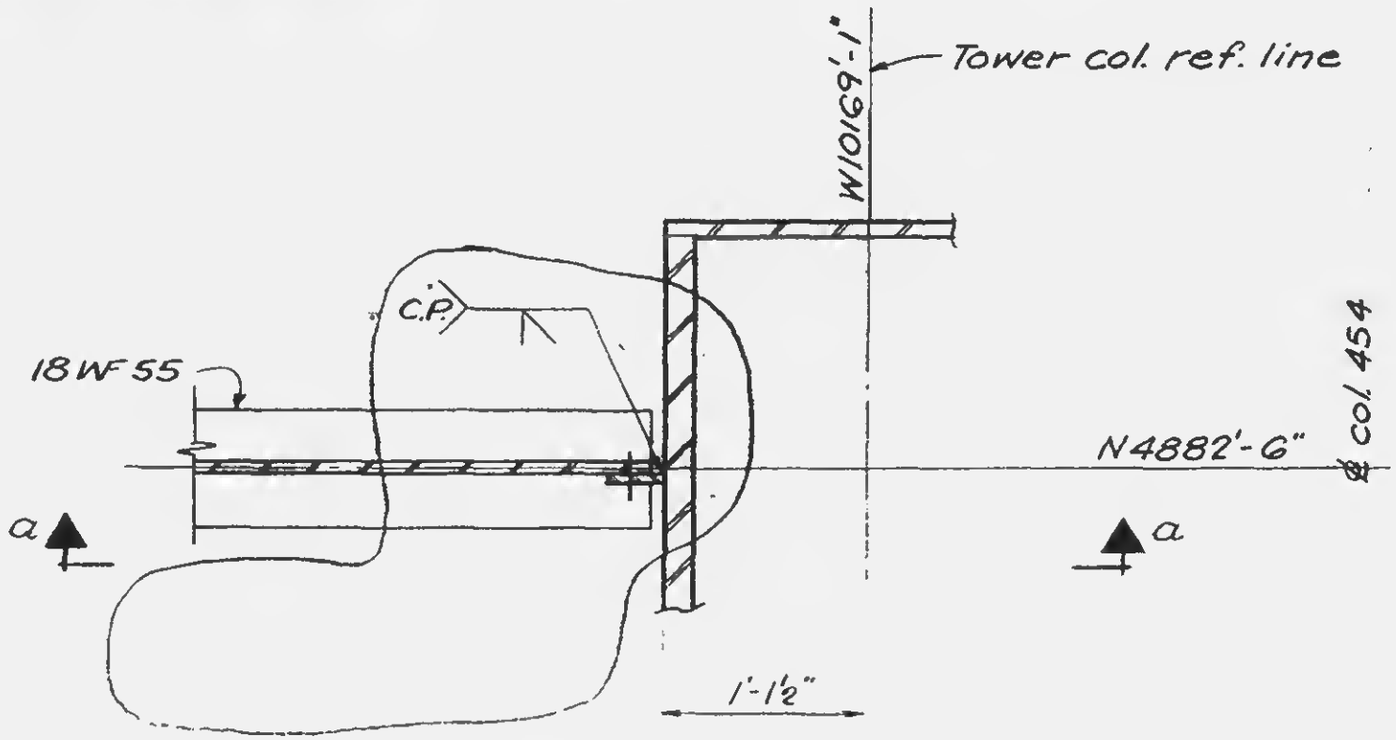
12-JK1-115

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

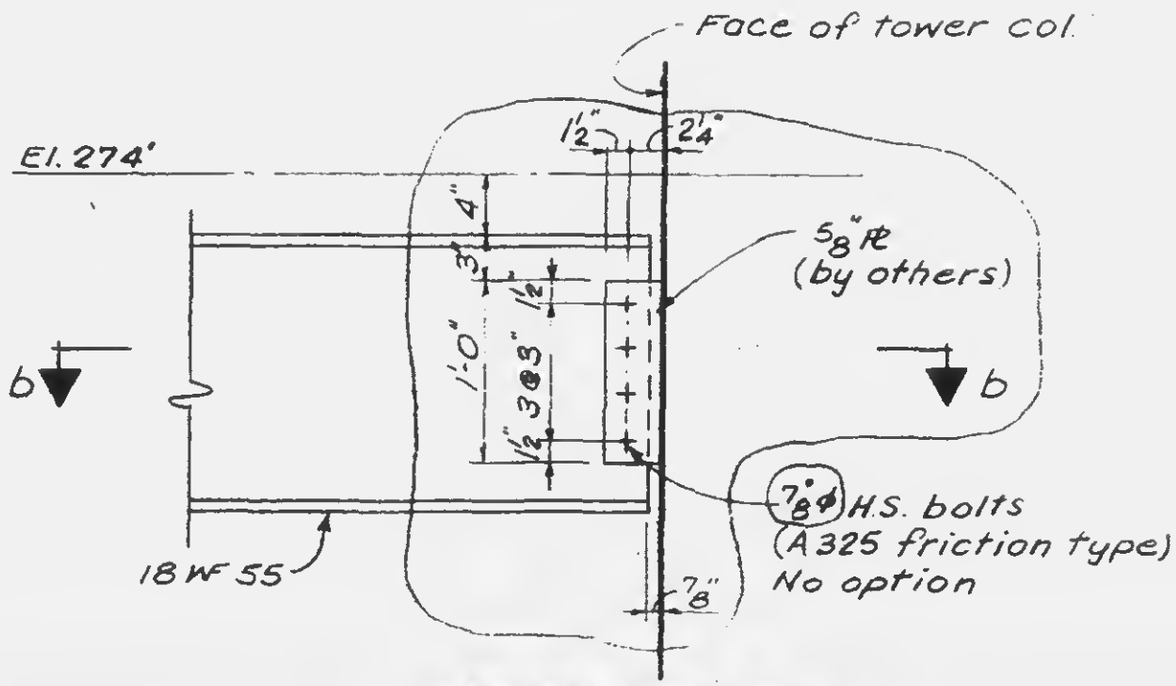
PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF BEAM CONNECTION TO TOWER 'A' | DATE: 1-5-68

REVISIONS

1-10-68



Section b-b



Section a-a

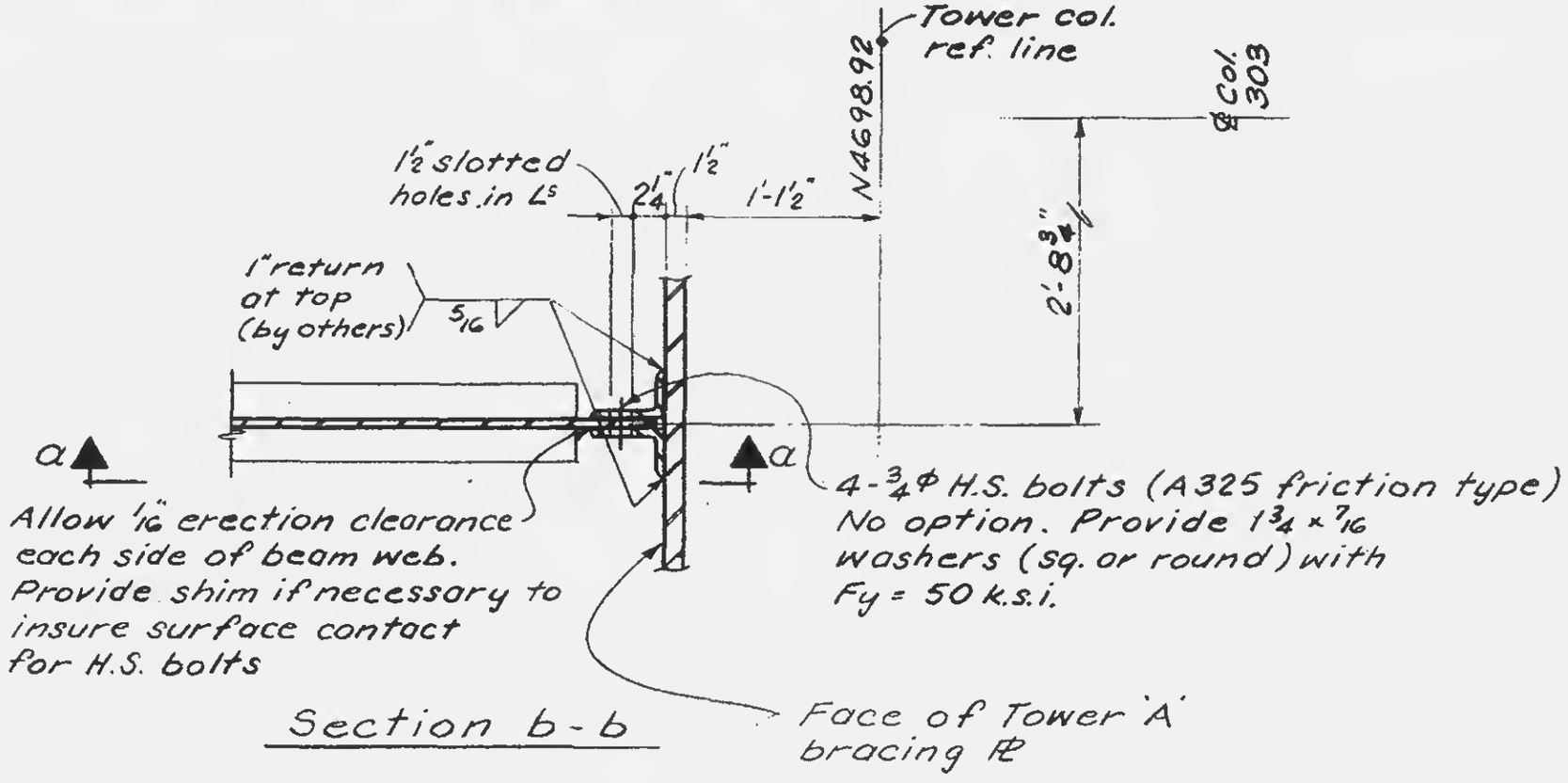
LESLIE E. ROBERTSON
No. 3498

12-JK1-116

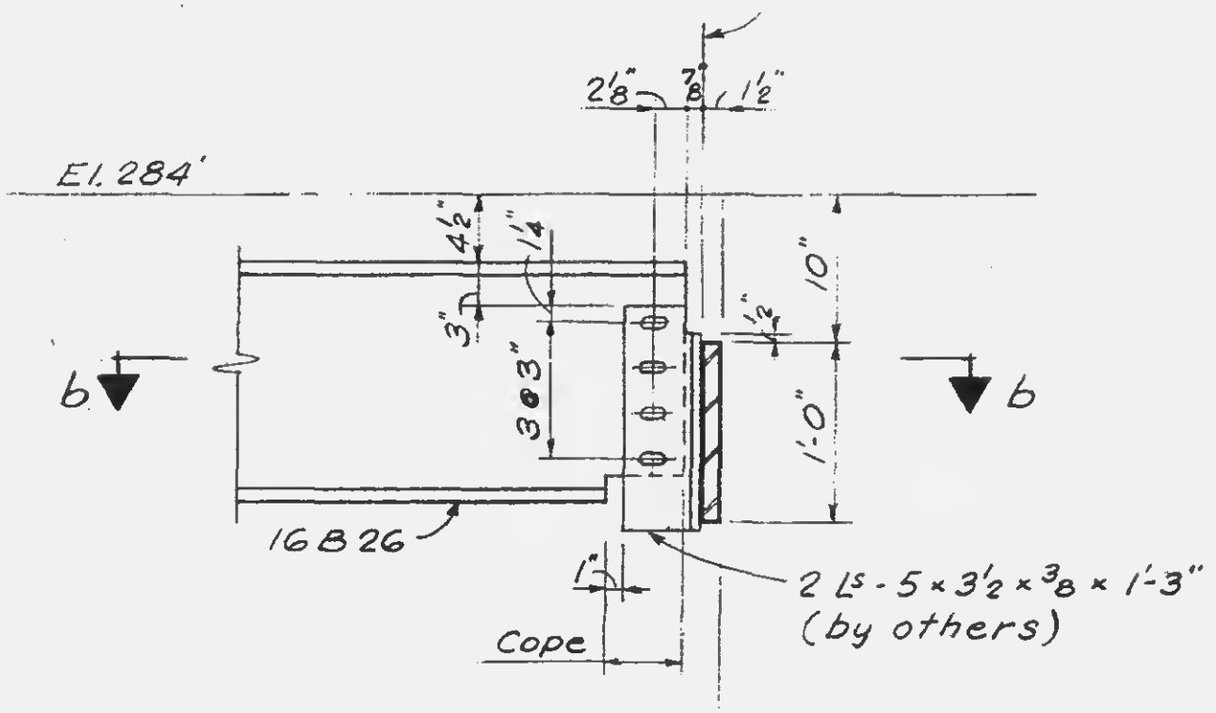
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF BEAM CONNECTION TO TOWER 'A' | DATE 6-28-68

REVISIONS



Section b-b



Section a-a

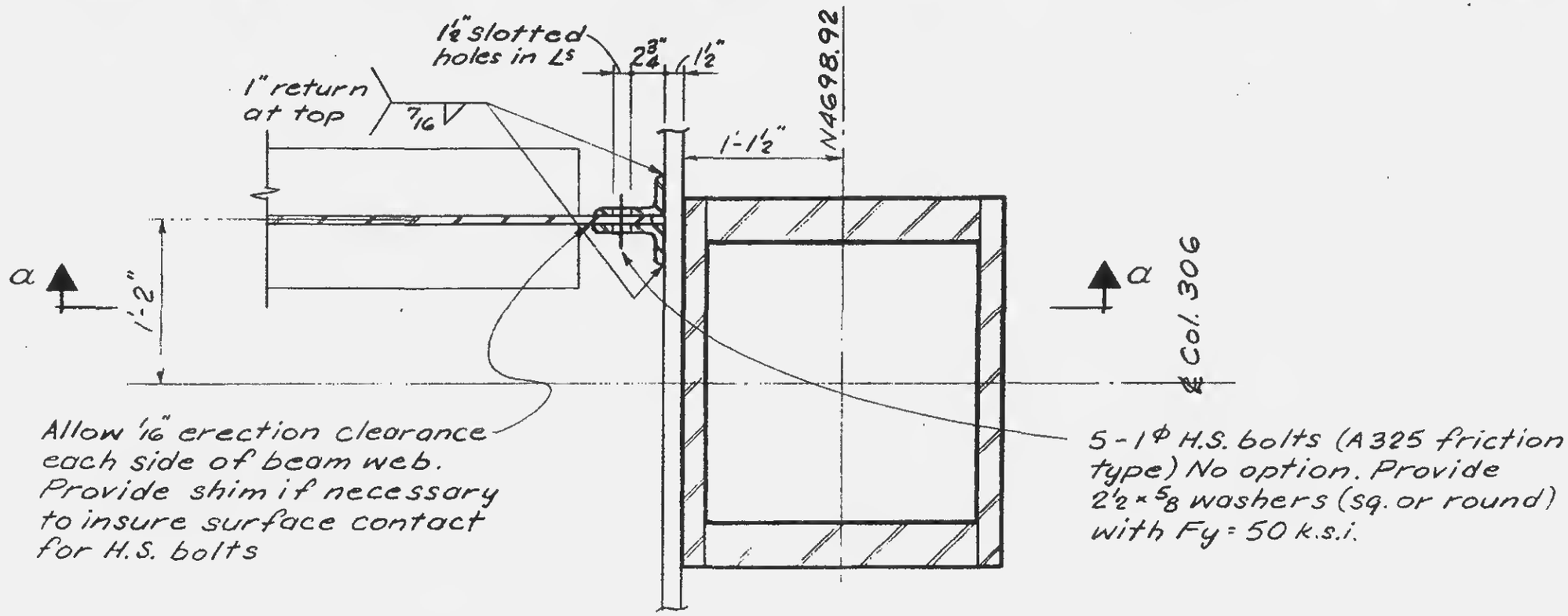
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-117

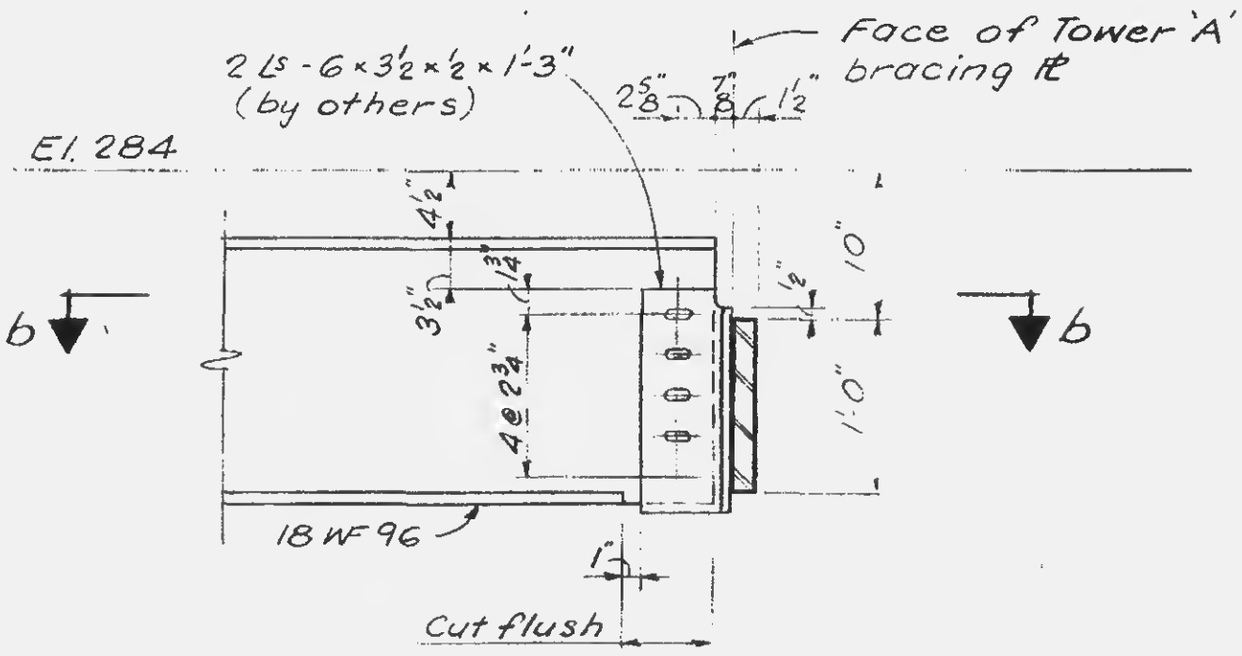
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF BEAM CONNECTION TO TOWER 'A' | DATE 6-28-68

REVISIONS



Section b-b



Section a-a

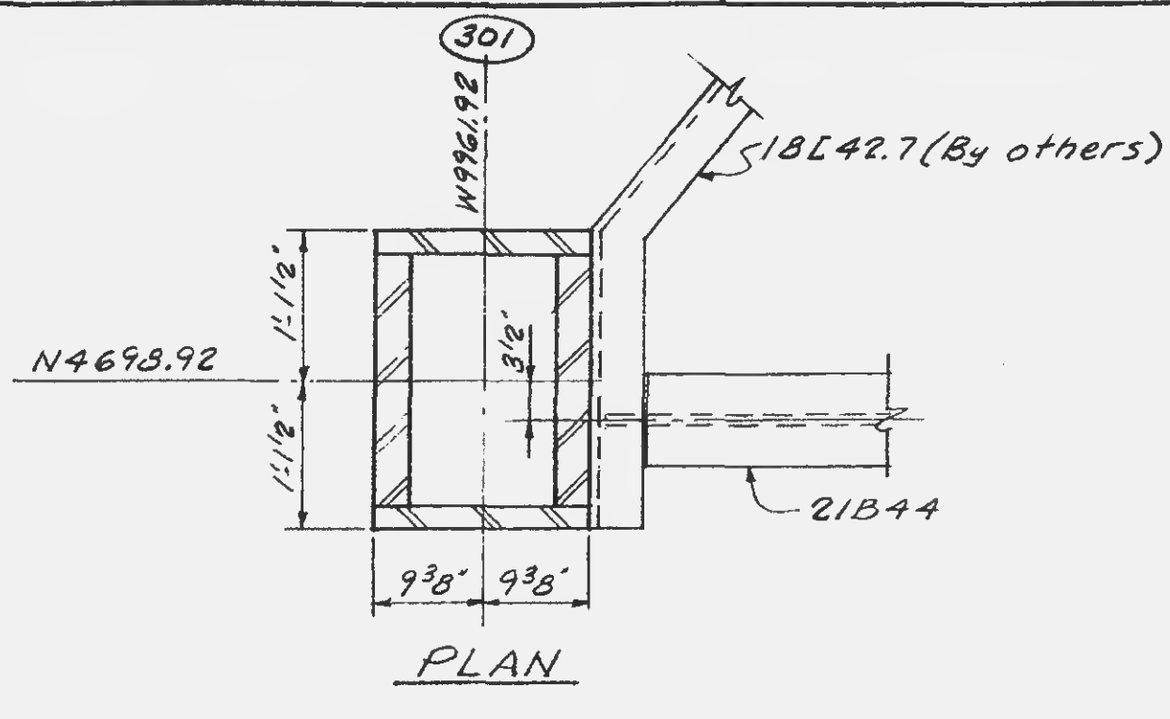
LICENSED PROFESSIONAL ENGINEER
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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK1-118

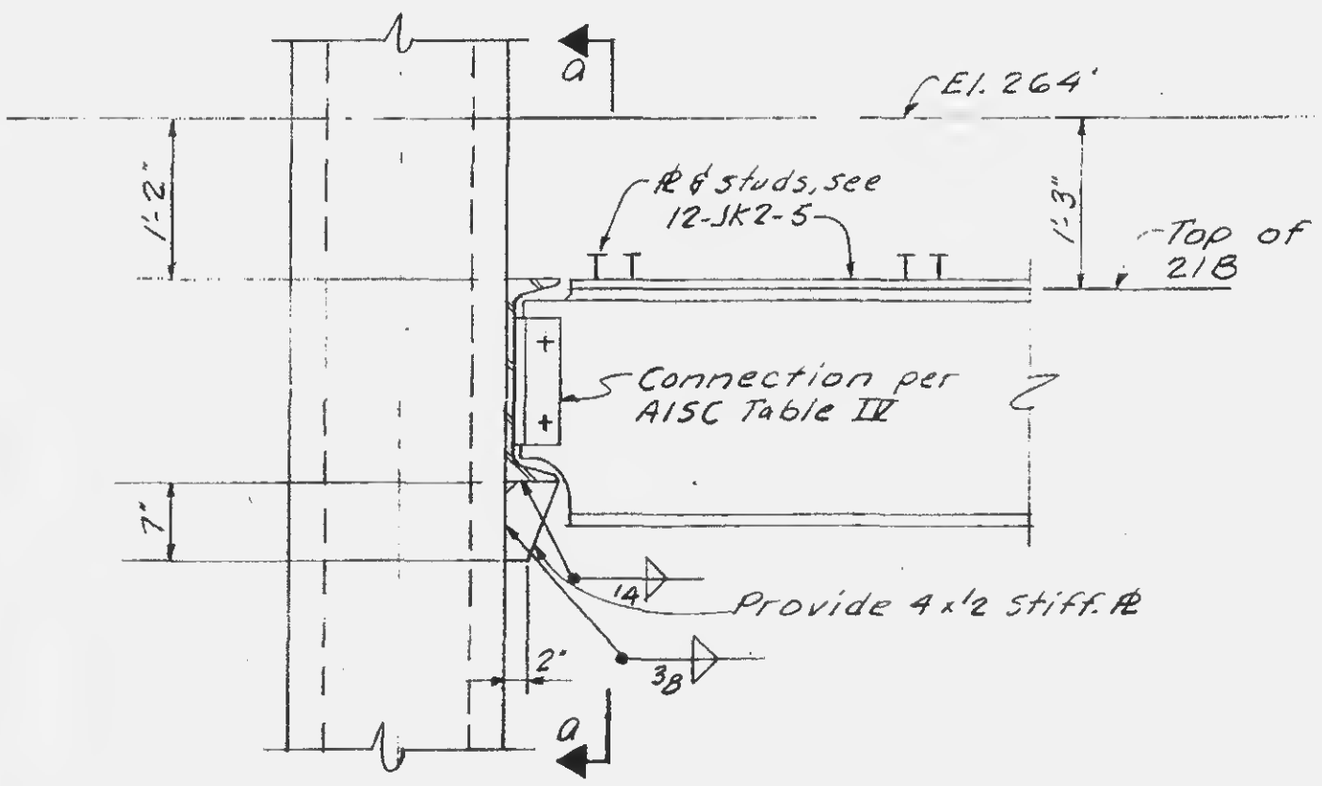
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM CONNECTION TO TOWER "A" | DATE: 10-15-68

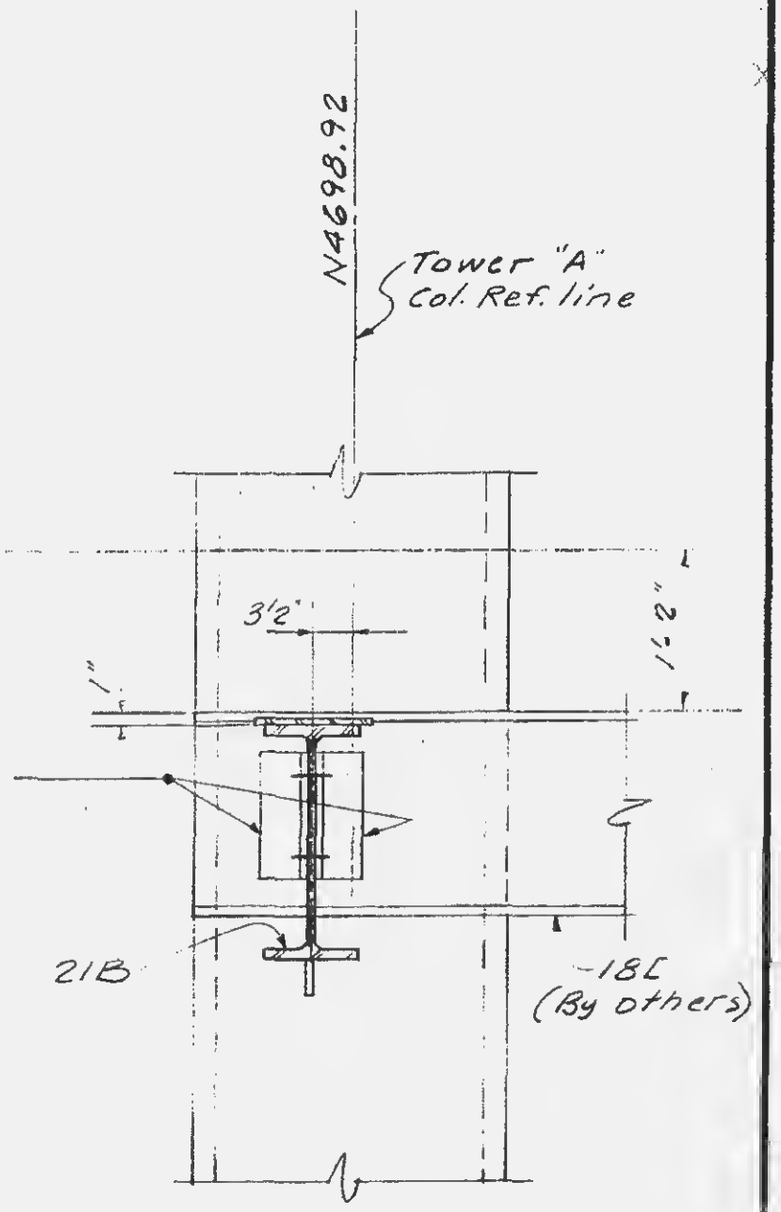
REVISIONS



PLAN



ELEVATION



Section a-a

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No. 34300
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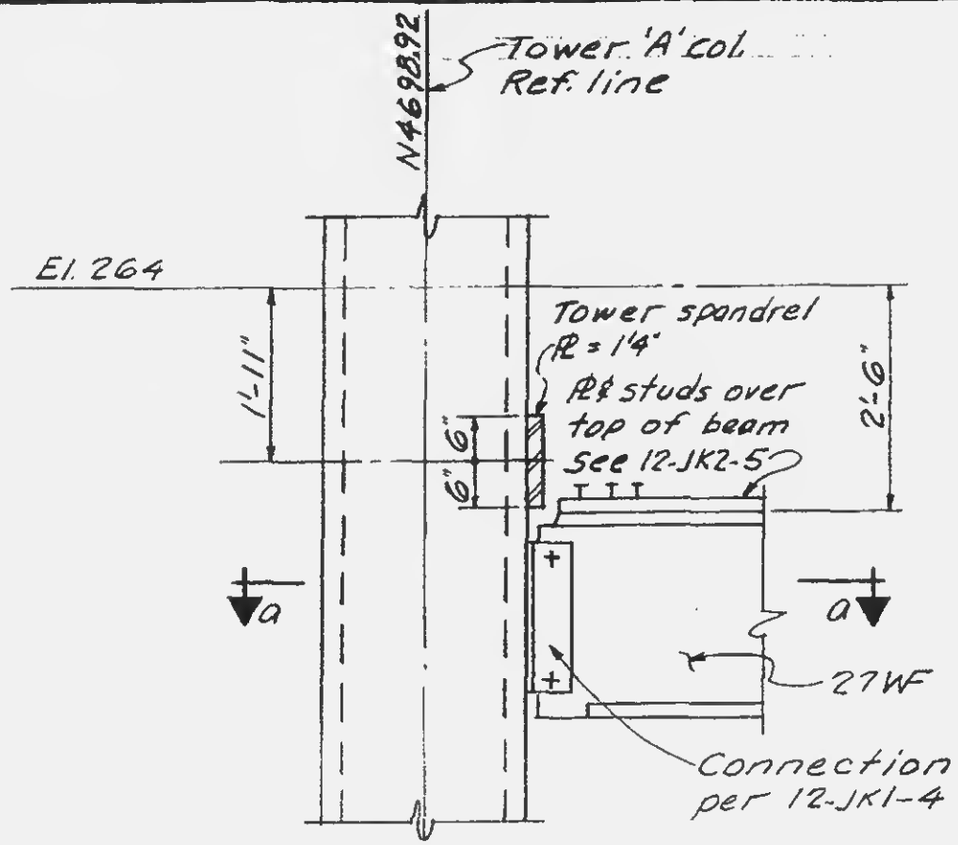
REVIEWED

12-JK1-119

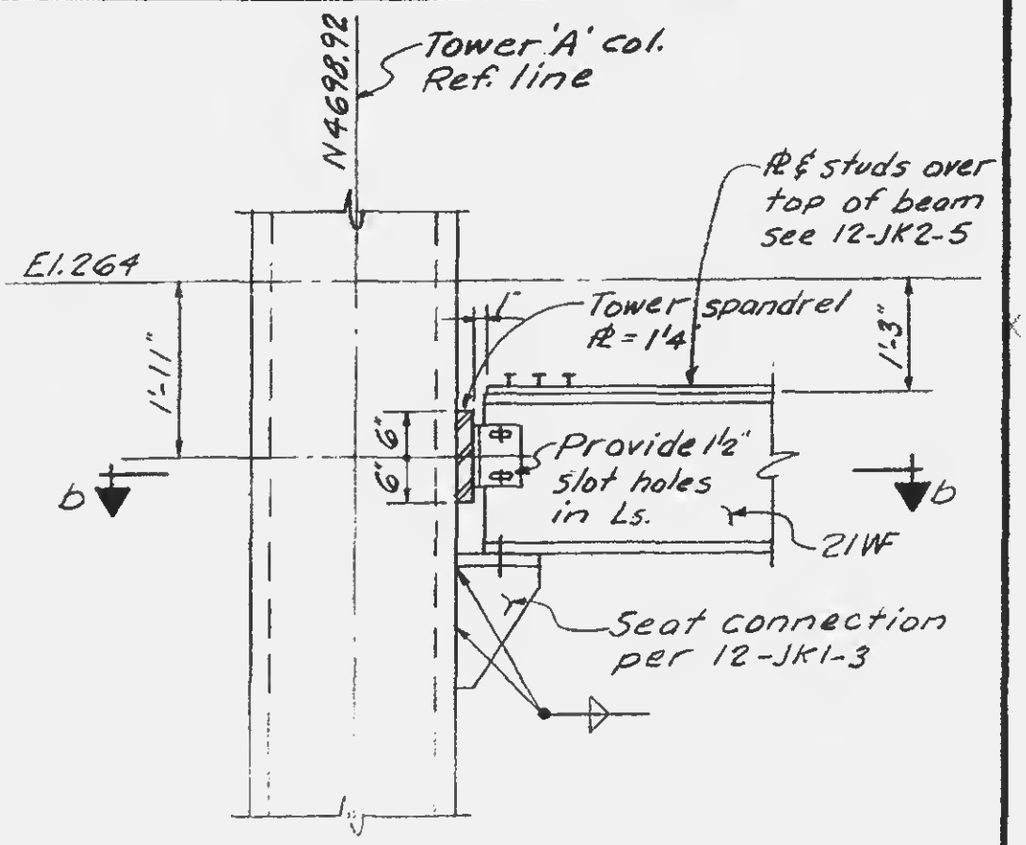
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM CONNECTION DETAIL TO TOWER 'A' | DATE: 11-5-68

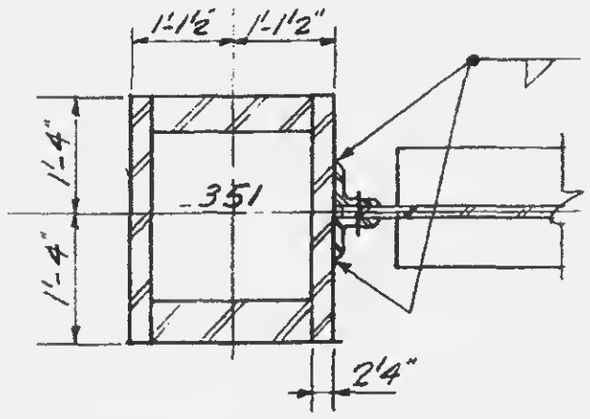
REVISIONS



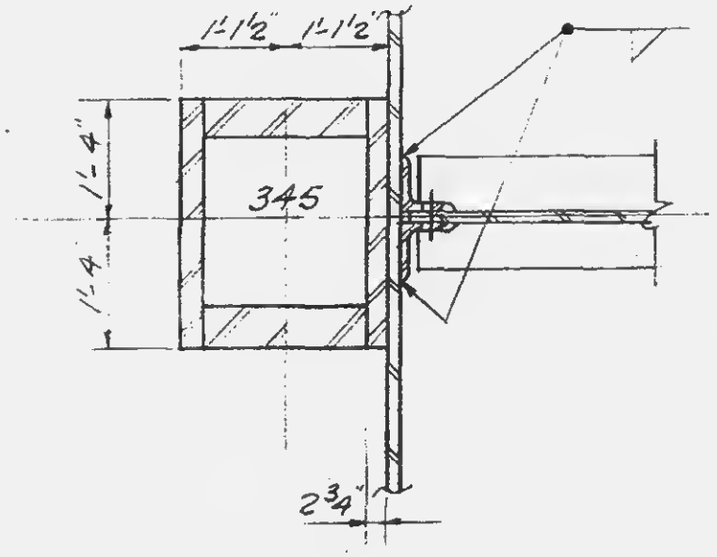
Detail-1



Detail-2



Section a-a



Section b-b

Note:
1. All welds to be E70xx

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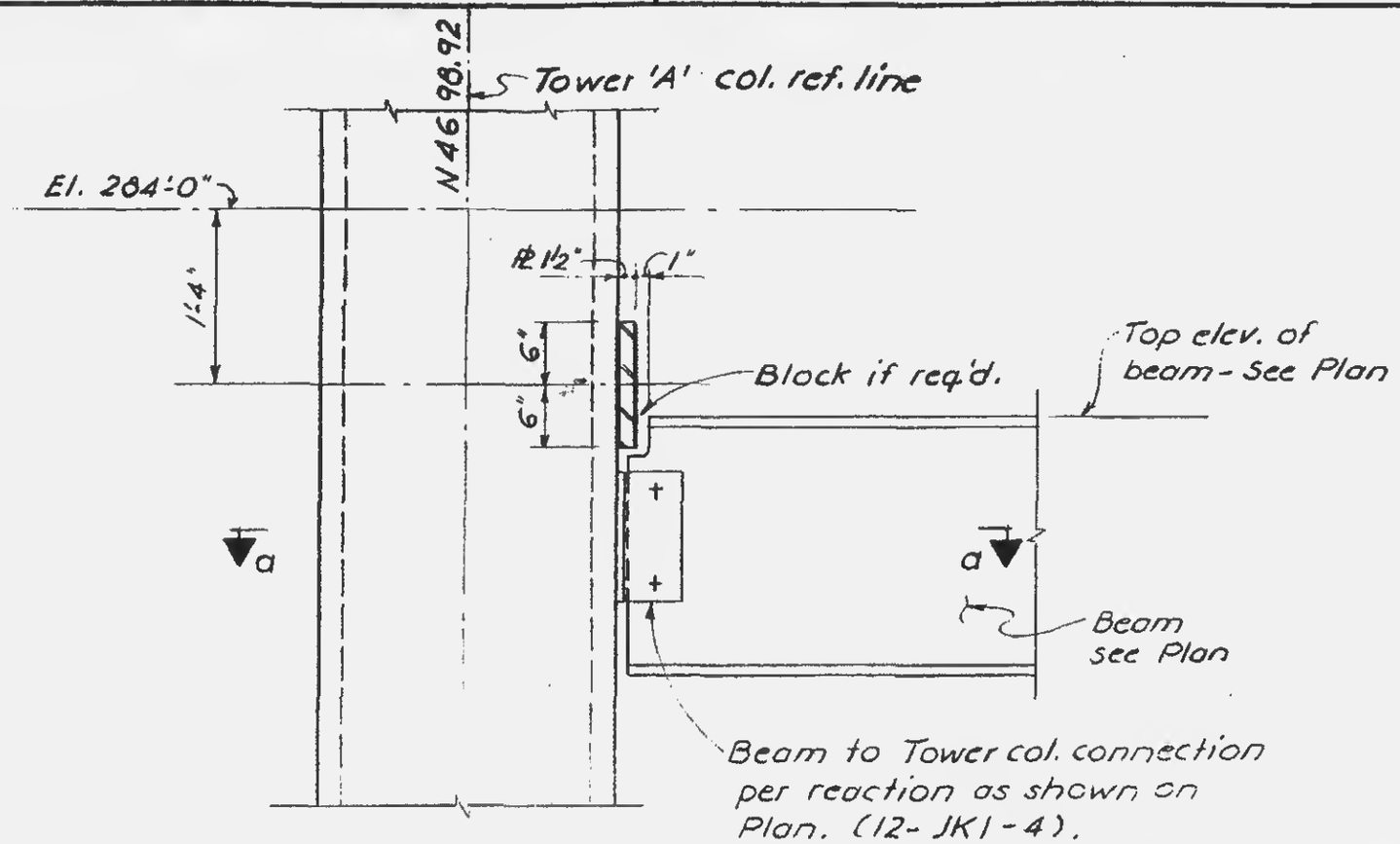
REVIEWED

12-JK1-120

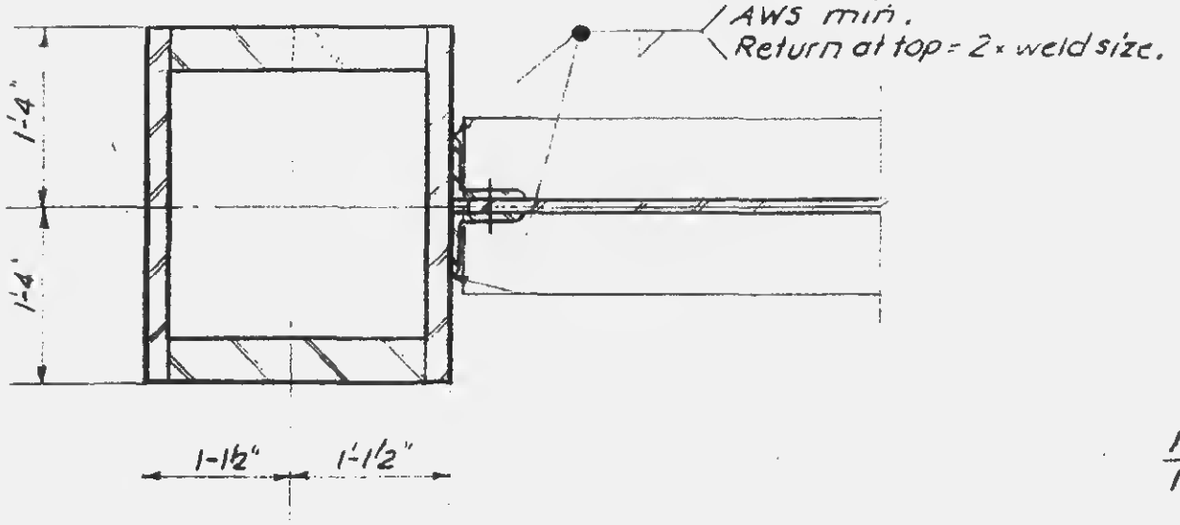
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PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM CONNECTION TO TOWER 'A' | DATE: 11-27-68

REVISIONS



ELEVATION



Section a-a

TOWER COLUMN ℄ - THICKNESS	
COL. NO.	t (IN)
303	1½
309	2
315	2¾
321	2¾
327	2⅞
333	3
339	3
351	2¼

Notes:
1. All welds to be E70xx.

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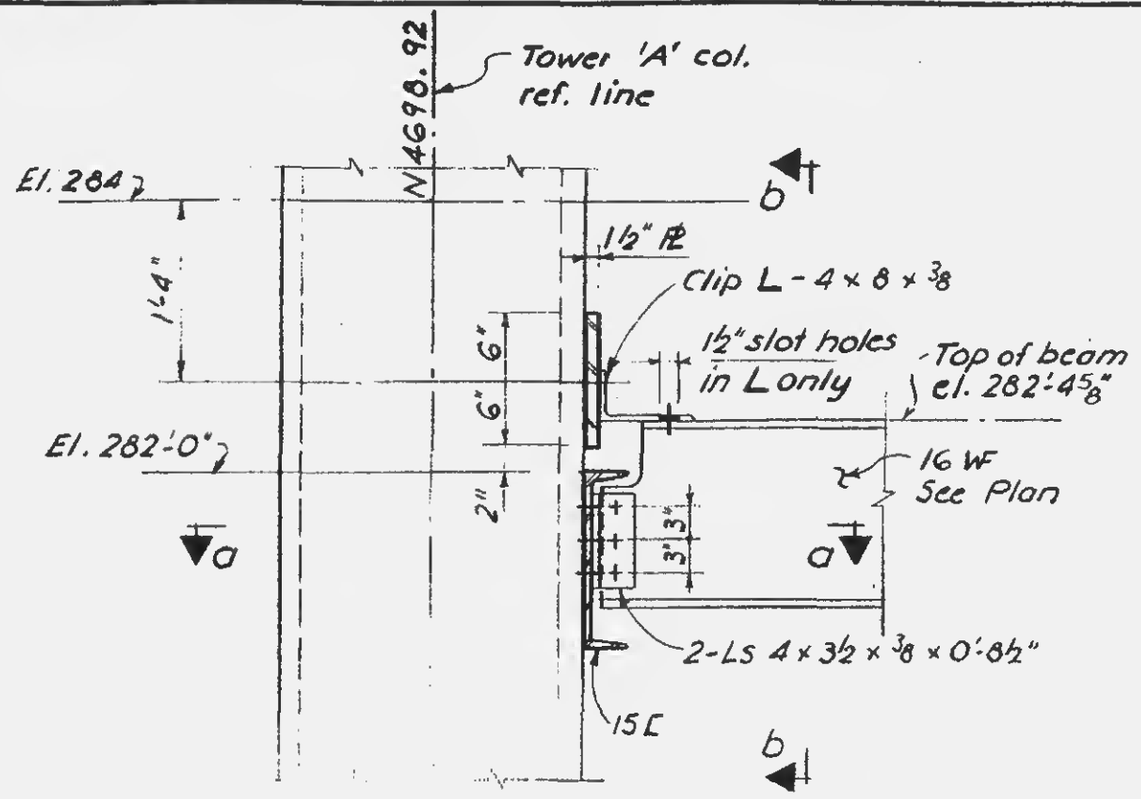
REVIEWED

12-JK1-121

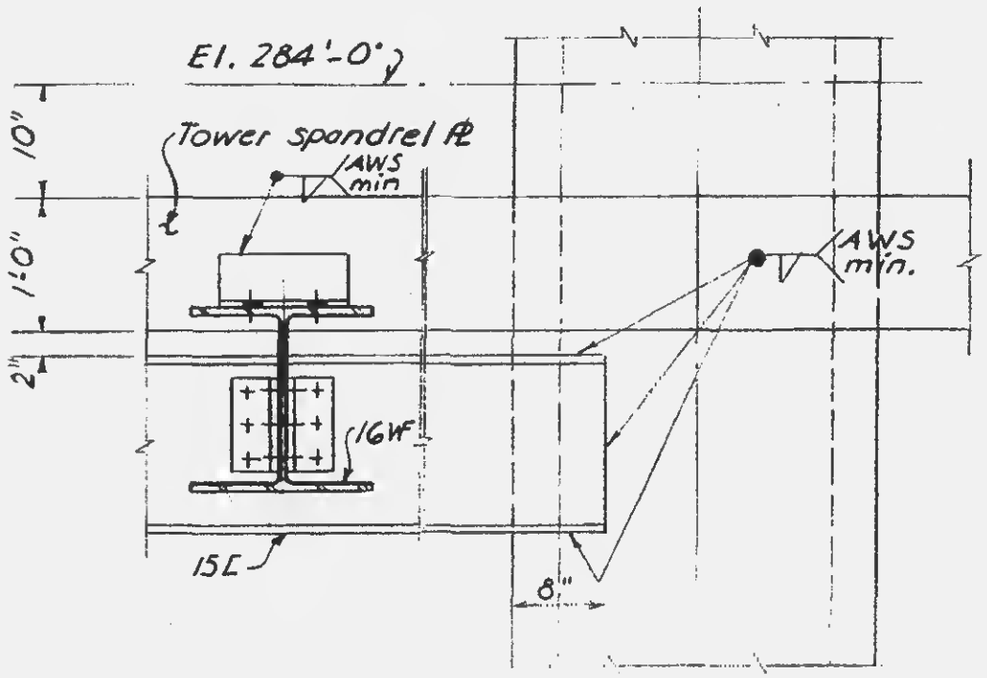
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION TO TOWER 'A' | DATE 11-27-68

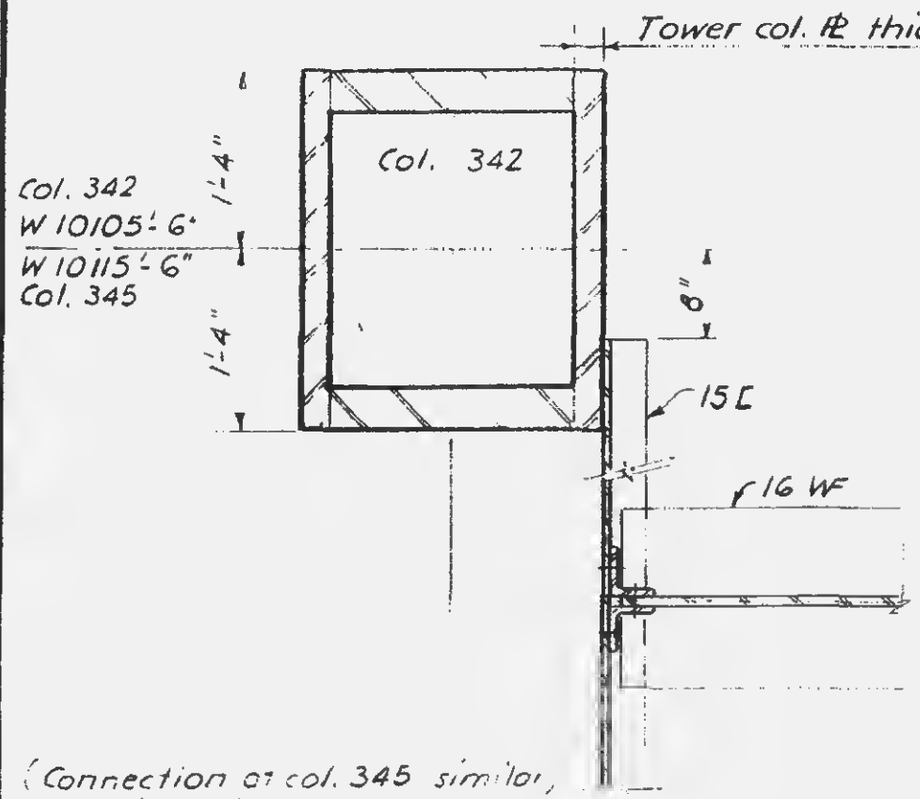
REVISIONS



ELEVATION



Section b-b



Section a-a

Notes:
1. All bolts to be ¾" ϕ H.S. friction type.
2. All welds to be E 70XX.

DESIGNED

DRAWN

REVIEWED

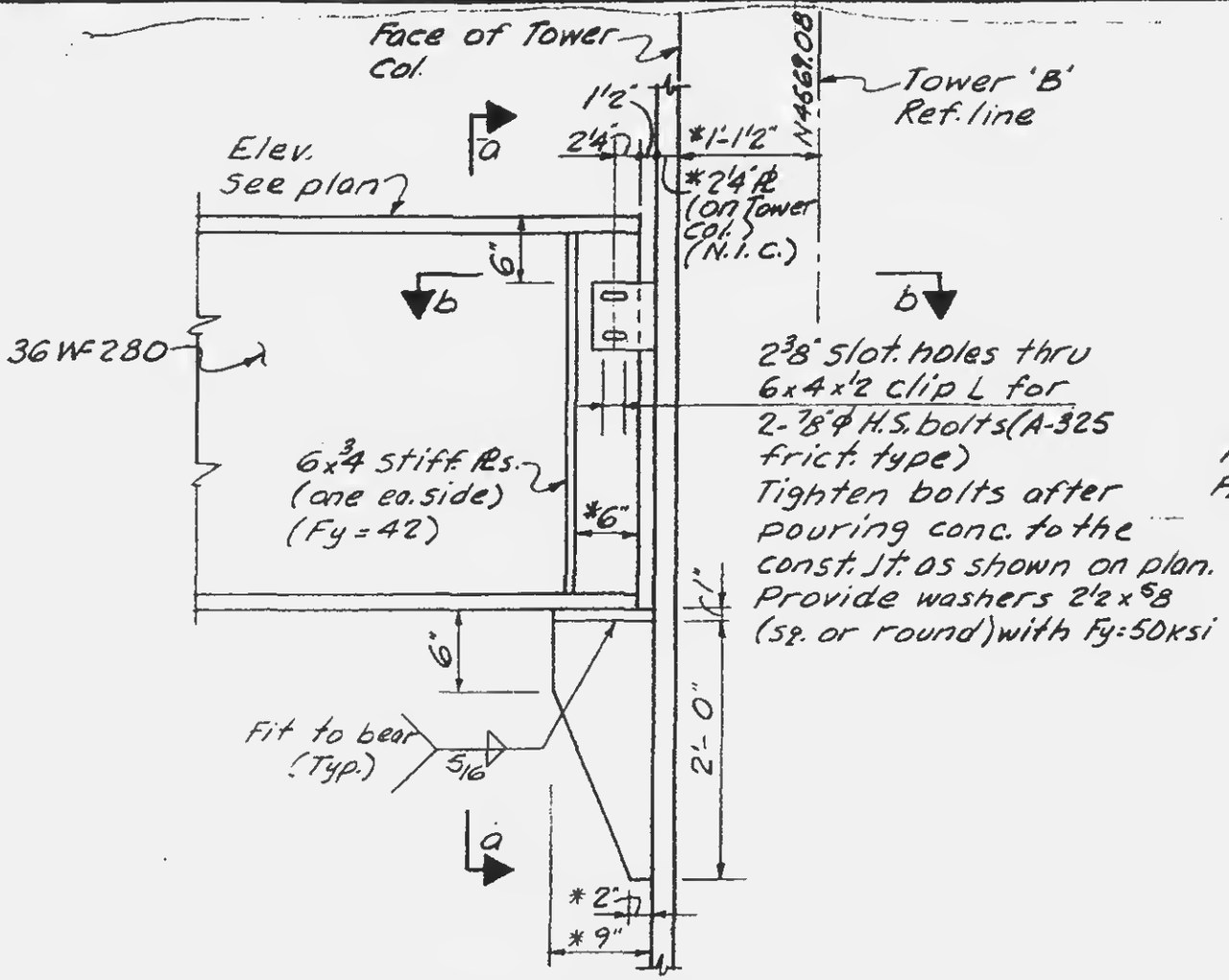
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12-JK1-122

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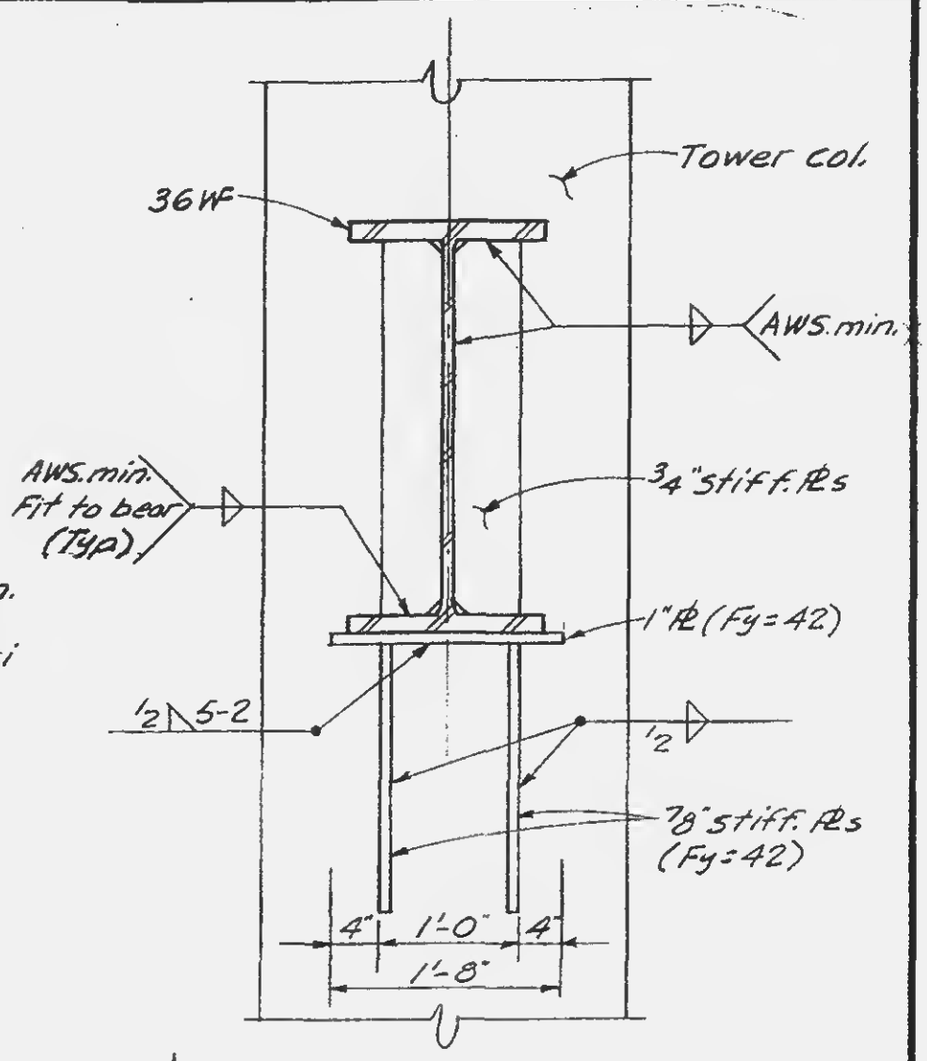
PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAIL TO TOWER B | DATE 9-20-68

REVISIONS
1-3-69



ELEVATION

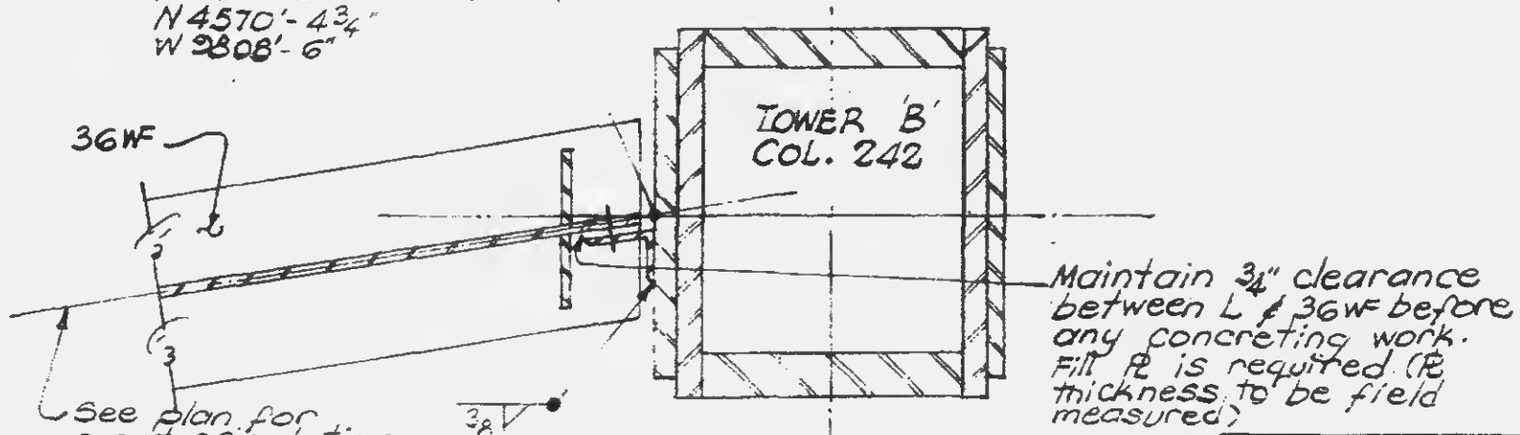
(All hor. dimensions are measured along ℄ beam passing thru W.P. except as shown with *)



Section a-a

NOTES

1. All welds to be E70 xx.



Section b-b

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DESIGNED

DRAWN A.F.

REVIEWED E.L.

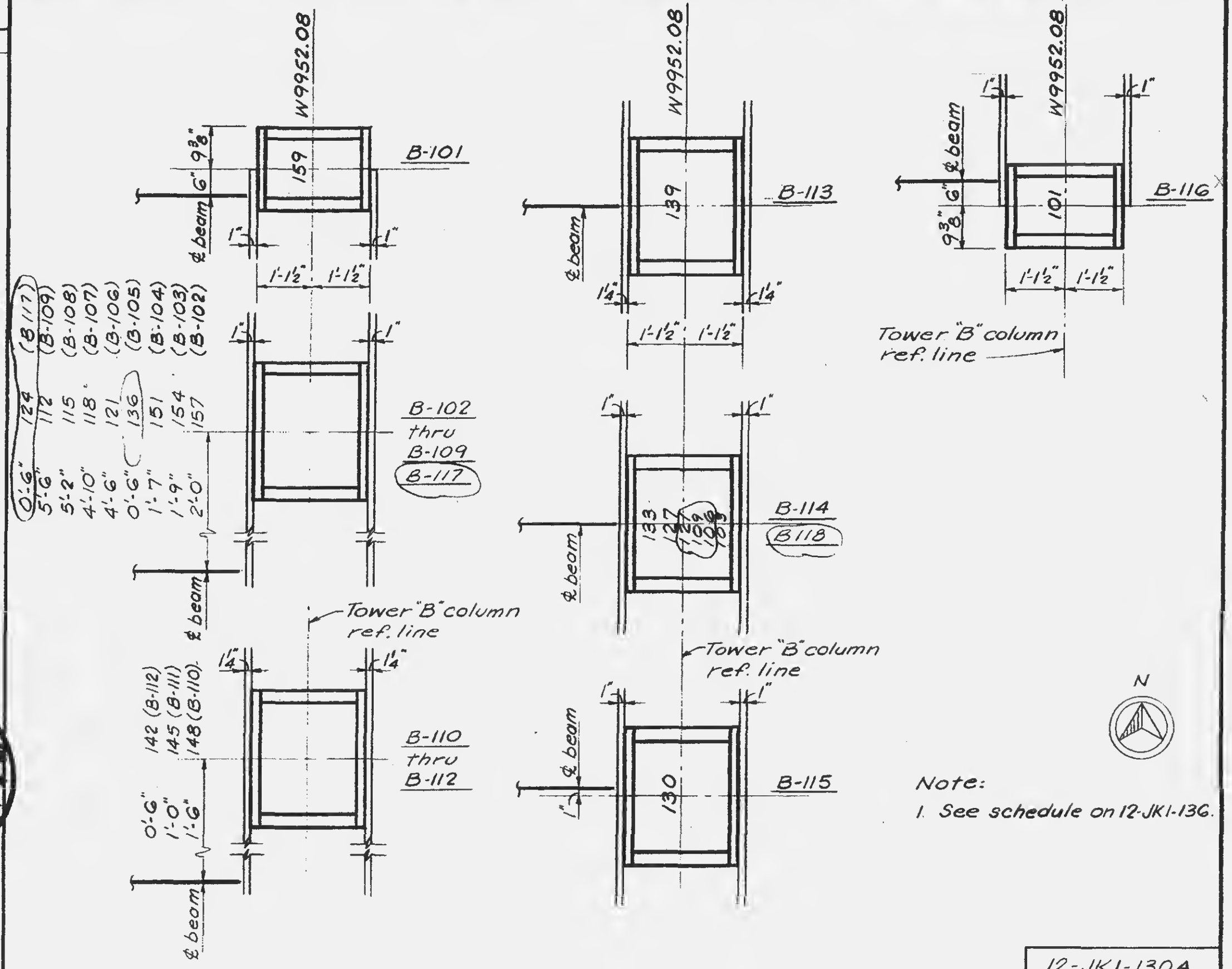
12-JK1-130

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM CONNECTION DETAIL TO W. OF TOWER "B" B101 THRU B116 | DATE: 12-3-68

REVISIONS

3-21-69



Note:

1. See schedule on 12-JK1-136.

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DRAWN S.C

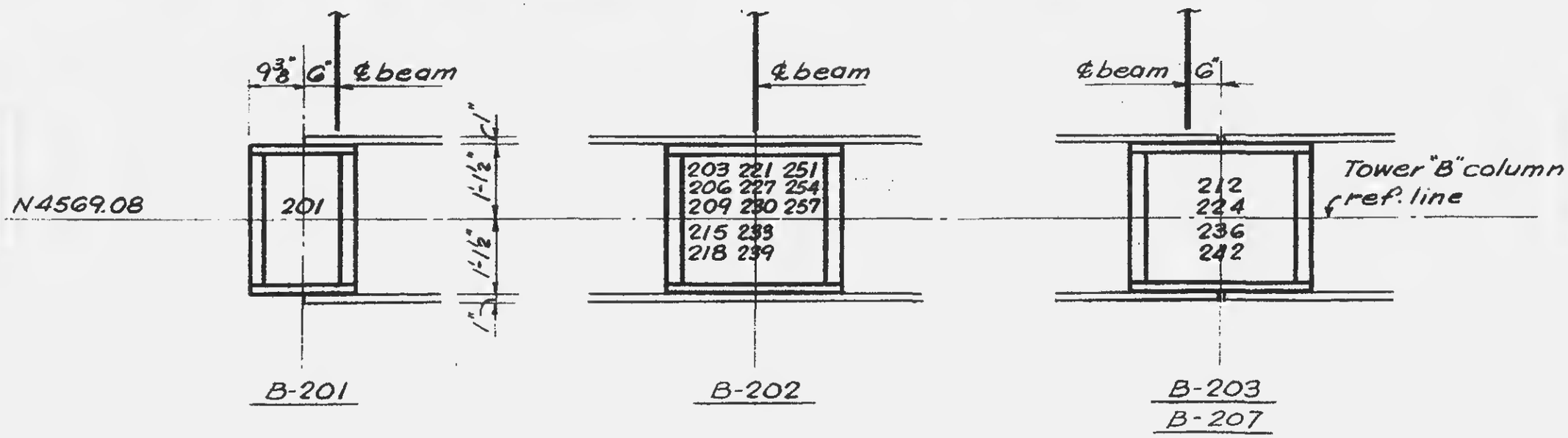
REVIEWED E.L.

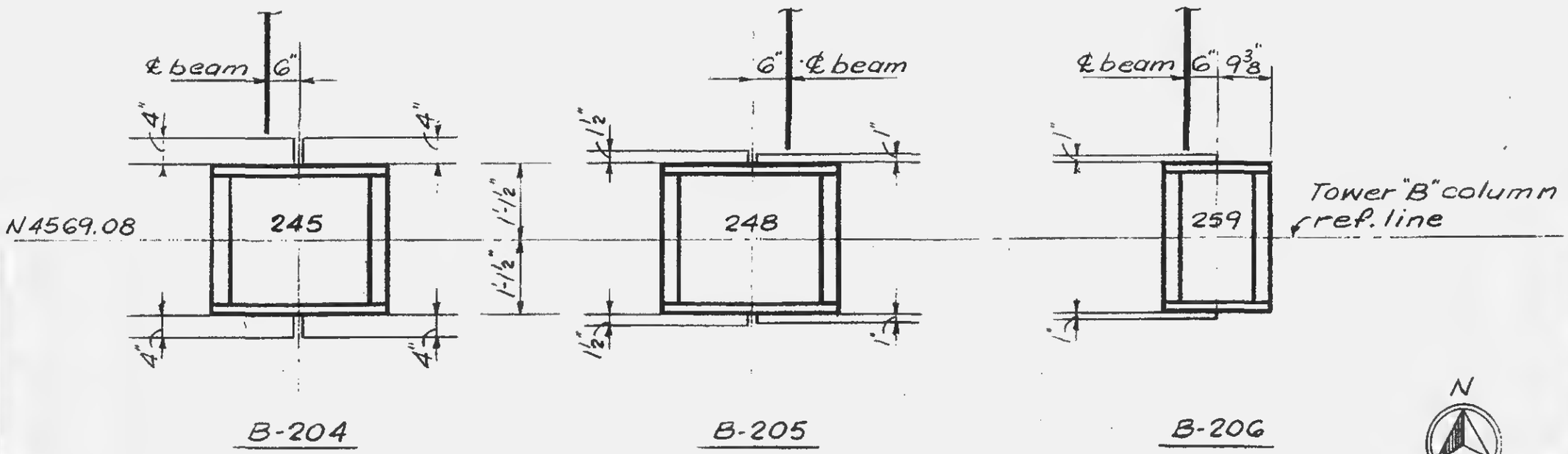
12-JK1-130A

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAIL TO N. OF TOWER 'B' - B-201 Thru B-207 | DATE 6-7-68

REVISIONS





Note:-
1. See schedule on 12-JK1-136

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12-JK1-131

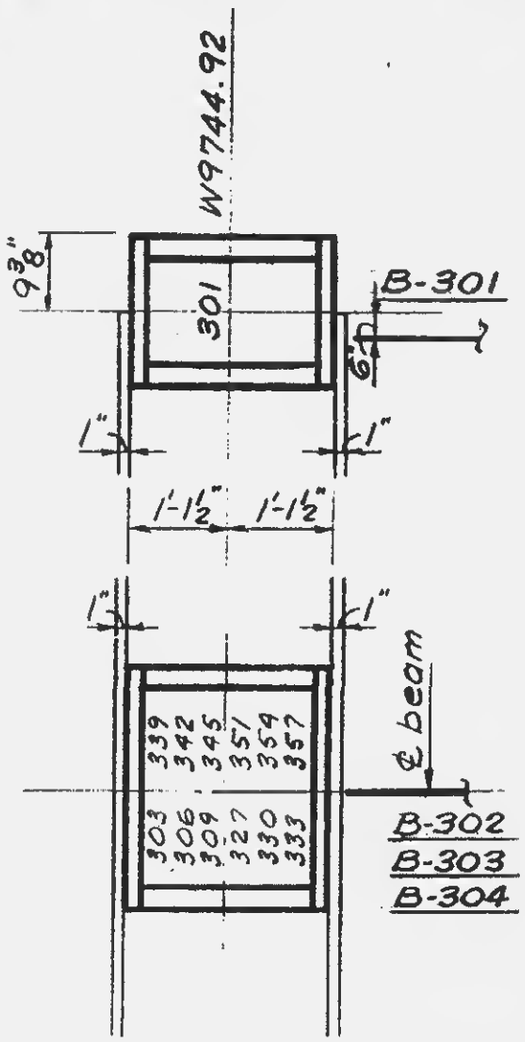
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

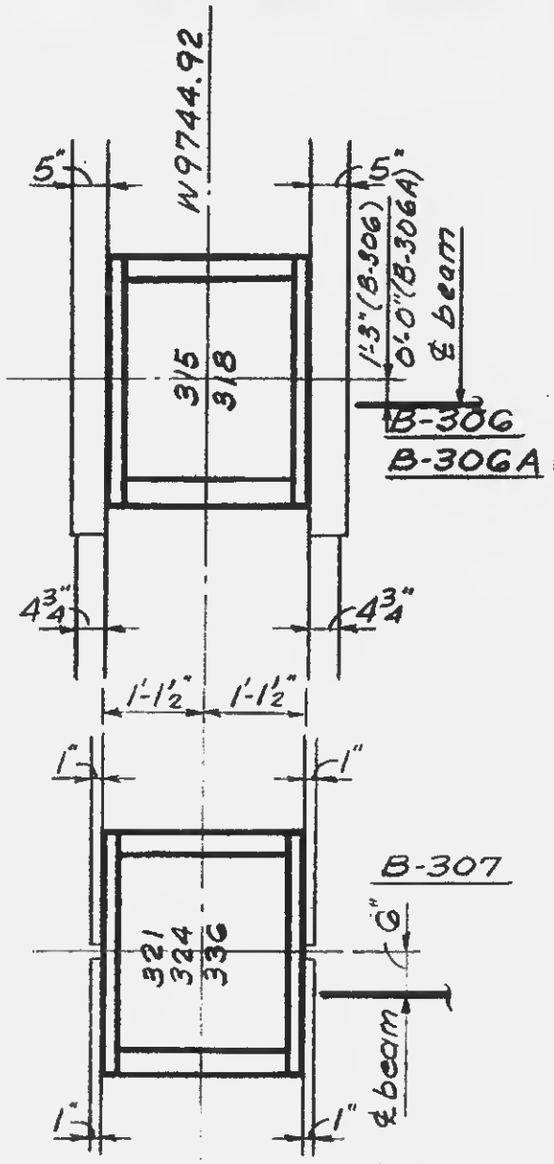
PROJECT: THE WORLD TRADE CENTER

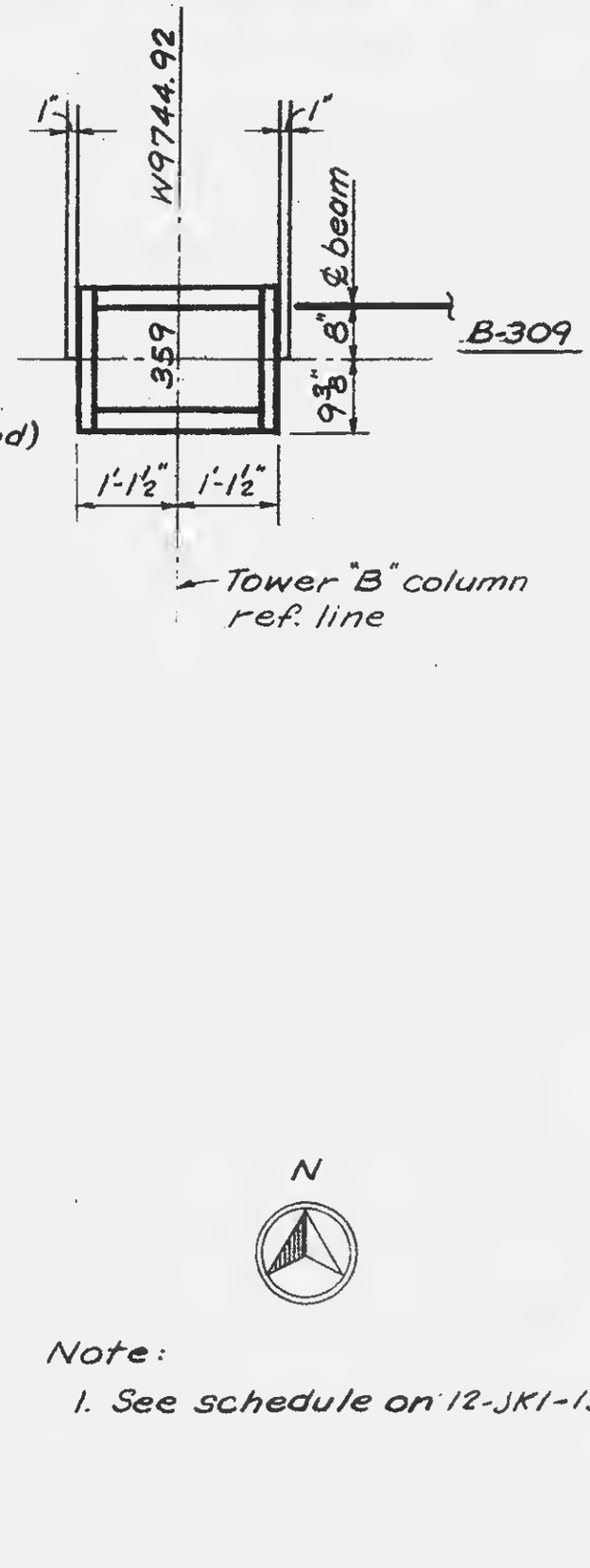
TITLE: BEAM CONNECTION DETAIL TO E. OF TOWER 'B' - B-301 thru B-309

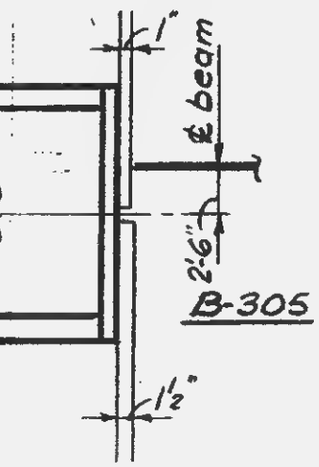
DATE: 12-17-68

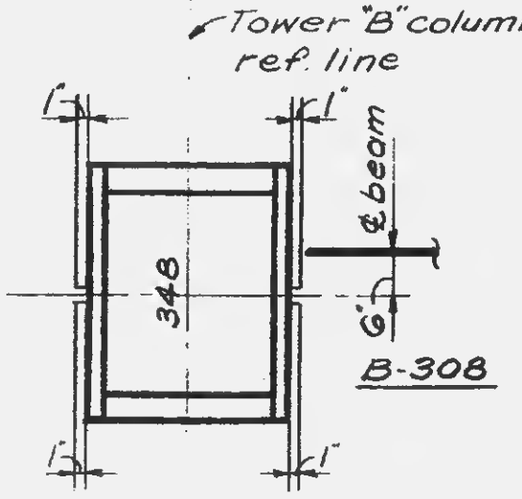
REVISIONS











Note:

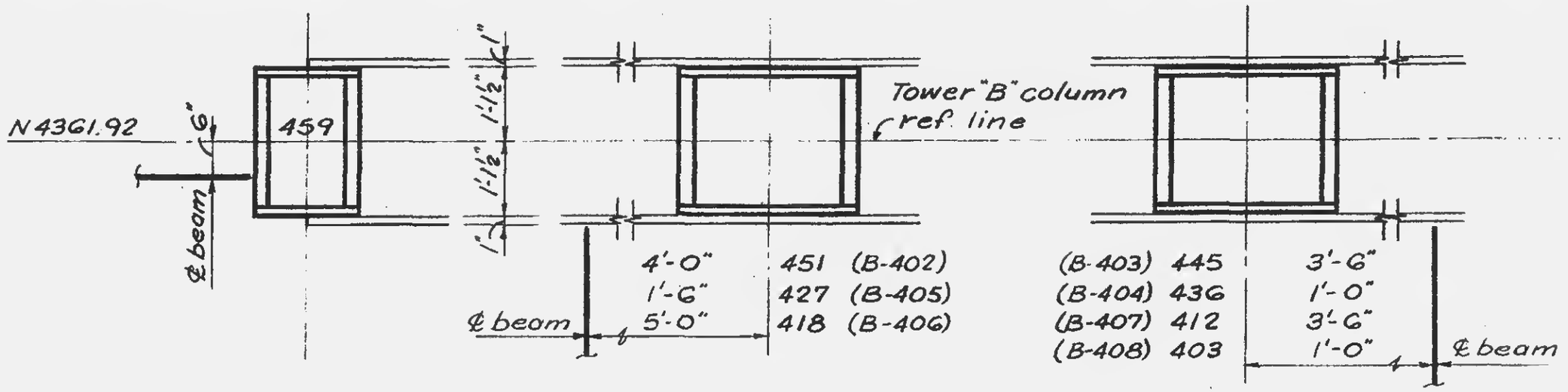
1. See schedule on 12-JK1-137

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PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAIL TO S. OF TOWER 'B' B-401 thru B-409 | DATE 6-11-68

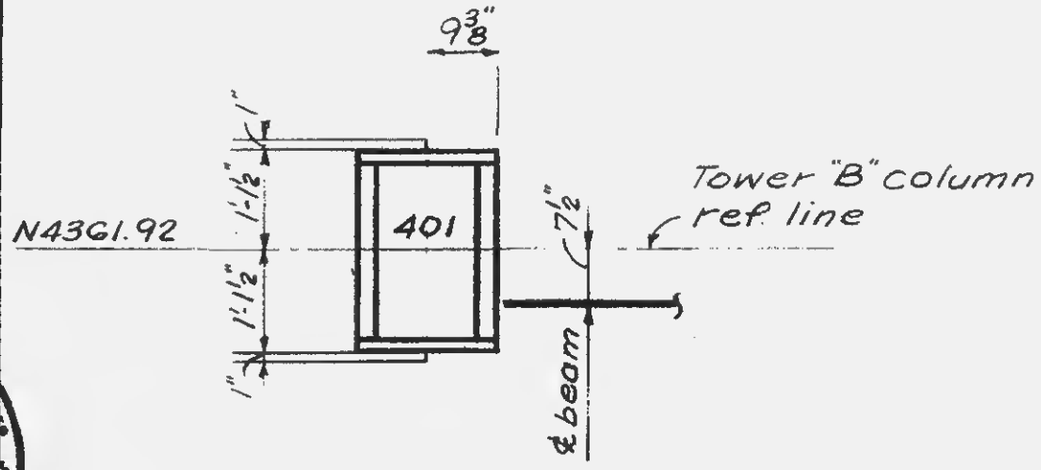
REVISIONS



B-401

B-402
B-405
B-406

B-403
B-404
B-407
B-408



B-409

Note:
1. See schedule on 12-JK1-137



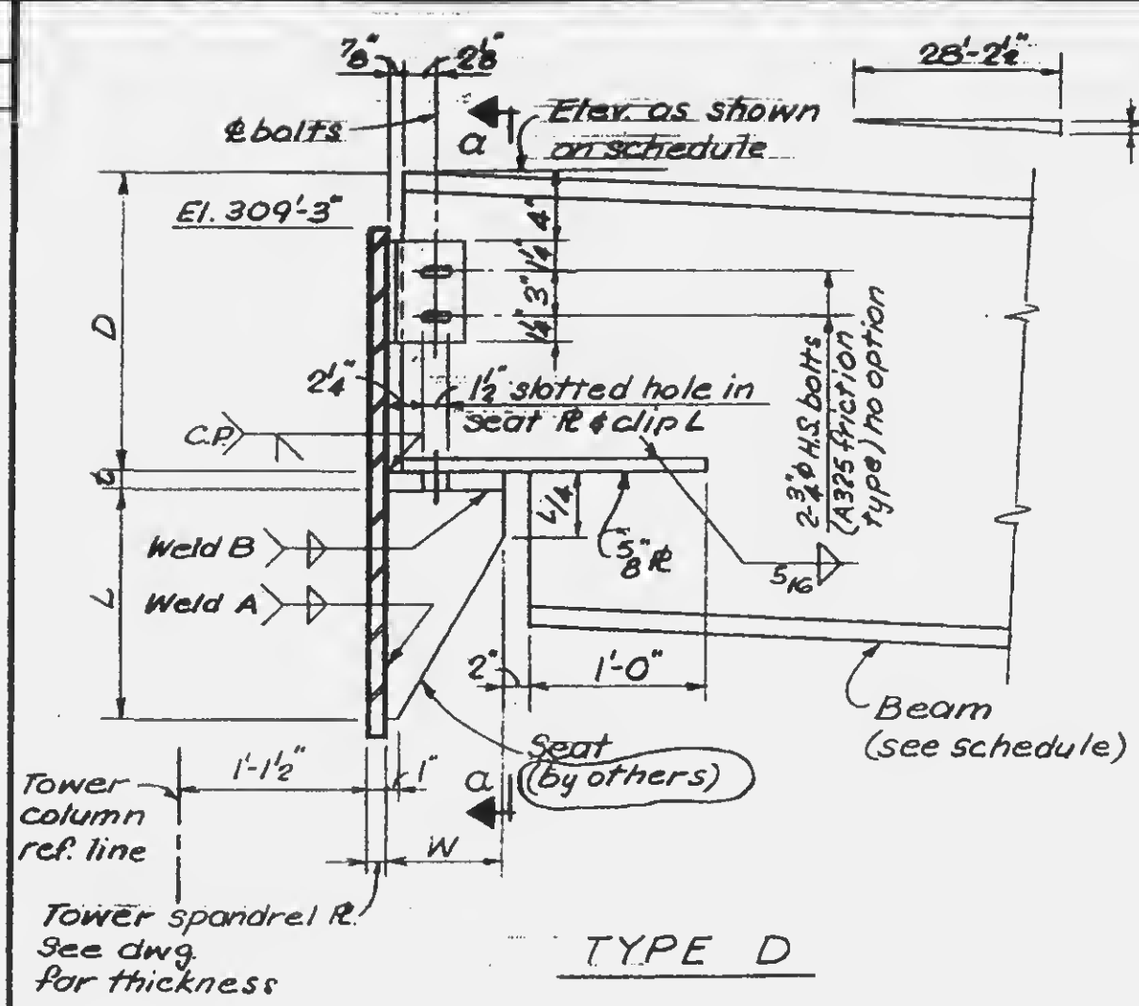


12-JK1-133

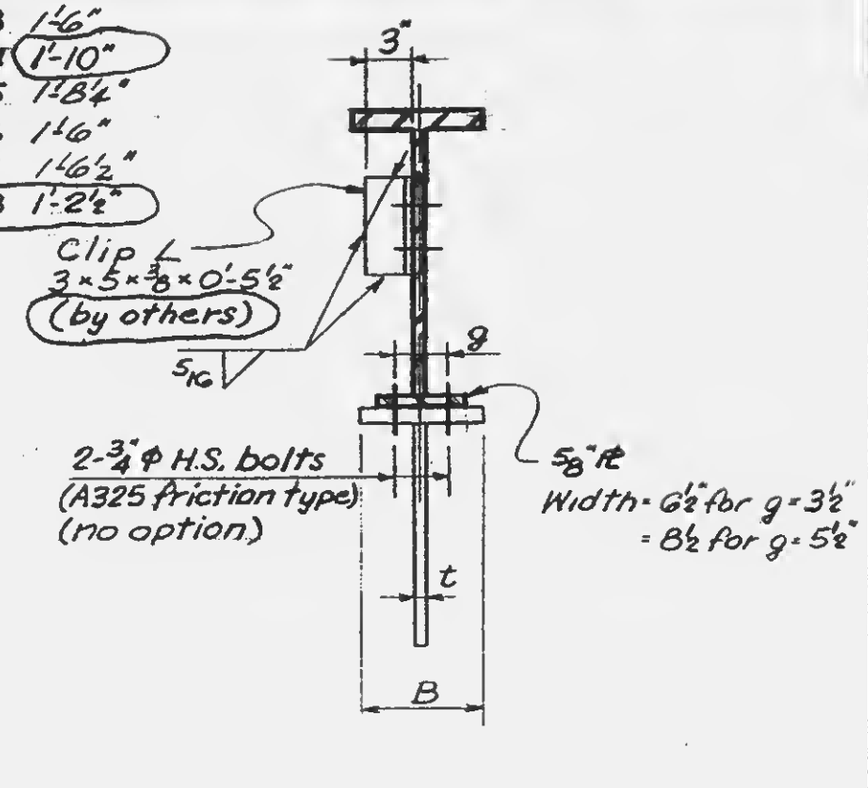
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT: Tourist Information Center TITLE: BEAM CONNECTION DETAIL TO TOWER - TYPE D DATE: 6-11-68

REVISIONS
2-19-69



B-402	1'-8"
B-403	1'-6"
B-404	1'-10"
B-405	1'-8 1/4"
B-406	1'-6"
B-407	1'-6 1/2"
B-408	1'-2 1/2"



Section a-a

Note:

1. Provide 1 3/4" x 7/16" washers (Fy = 50 k.s.i.) sq. or round.

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No. 34360
OF THE STATE OF NEW YORK

DRAWN S.C.
REVIEWED E.L.

12-JK1-135

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: SCHEDULE FOR BEAM CONNECTION TO TOWER 'B' | DATE: 6-7-68

REVISIONS
12-3-68
2-19-69
3-21-69

DETAIL No.	BEAM			CONNECTION									g
				TYPE	SEAT ℄			STIFFENER ℄			WELD SIZE		
	SIZE	ELEV.	D		W	t	B	W	t	L	A	B	
B-101	16WF36	309'-1"		C	6"	1/2"	6 1/2"	6"	1/2"	12"	5/16"	5/16"	3 1/2"
B-102	↕	↕		C	↕	↕	↕	↕	↕	↕	↕	↕	↕
B-103				C									
B-104				C									
B-105	16WF36			C	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2
B-106	24WF84		1'-3 7/8"	B	9	3/4	8 1/2	9	3/4	18	1/2	1/2	5 1/2
B-107	16WF36			C	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2
B-108	16WF36			C	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2
B-109	30WF190			C	9	1	8 1/2	9	1	22	1/2	1/2	5 1/2
B-110	16WF36			C	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2
B-111	↕			C	↕	↕	↕	↕	↕	↕	↕	↕	↕
B-112				C									
B-113		309'-1"		C									
B-114	16WF36	308'-9"		C	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2
B-115	24WF84	308'-9"	0'-11 7/8"	B	9	3/4	8 1/2	9	3/4	18	1/2	1/2	5 1/2
B-116	33WF240	308'-1"	1-10"	B	9	1 1/8	8 1/2	9	1 1/8	22 7/8	5/8	1/2	5 1/2
B-117	16WF36	308'-9"	0'-11 7/8"	B	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2
B-118	16WF36	309'-1"		C	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2
B-201	21B44	309'-3"	1'-8 5/8"	B	9	3/4	8 1/2	9	3/4	18	1/2	1/2	5 1/2
B-202	16B31	309'-1"		C	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2
B-203	21B44	↕	1'-3 7/8"	B	↕	↕	↕	↕	↕	↕	↕	↕	↕
B-204	16WF36			C		↕	↕		↕	↕			↕
B-205	16WF36			C		1/2	6 1/2		1/2	12			3 1/2
B-206	16WF78	↕		C	↕	3/4	8 1/2	↕	3/4	14	5/16	5/16	5 1/2
B-207	16WF58	309'-1"		C	6	3/4	8 1/2	6	3/4	14	3/8	3/8	5 1/2

NOTE:-

1. See dwg. 12-JK1-106 for detail of connection.

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DRAWN S.C.

REVIEWED E.L.

12-JK1-136

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE SCHEDULE FOR BEAM CONNECTION TO TOWER 'B' | DATE 6-11-68

REVISIONS
12-17-68
2-19-69

DETAIL No.	BEAM			CONNECTION										g
				TYPE	SEAT ℄			STIFFENER ℄			WELD SIZE			
	SIZE	ELEV.	D		W	t	B	W	t	L	A	B		
B-301	16WF36	309'-1"		C	6"	1/2"	6 1/2"	6"	1/2"	12"	5/16"	5/16"	3 1/2"
B-302	36WF300	309'-1"	2'-0"	B	8	3/4	8 1/2	8	3/4	18	3/8	3/8	5 1/2
B-303	16WF36	309'-1"		C	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2
B-304	↑	308'-9"		C	↑	↑	↑	↑	↑	↑	↑	↑	↑
B-305		309'-1"		C									
B-306		↑		C									
B-306A				C									
B-307		↓		C									
B-308	↓	309'-1"		C	↓	↓	↓	↓	↓	↓	↓	↓	↓
B-309	16WF36	308'-9"		C	6	1/2	6 1/2	6	1/2	12	5/16	5/16	3 1/2
B-401	36WF230	308'-1"	2'-2"	B	9	1	8 1/2	9	1	22	1/2	1/2	5 1/2
B-402	36WF260	N. 308'-1" S. 306'-5"	1'-9"	D	↑	1 1/16	↑	↑	1 1/16	24	5/8	5/8	↑
B-403	↑	N. 308'-1" S. 306'-7"	↑	D		↑			↑	↑	↑	↑	
B-404		N. 308'-6" S. 306'-8"		D									
B-405		N. 308'-6" S. 306'-9 3/4"		D									
B-406		N. 308'-6" S. 307'-0"		D								↓	
B-407	↓	N. 308'-9" S. 307'-2 1/2"	↓	D	↓	↓	↓	↓	↓	↓	↓		↓
B-408	36WF260	N. 308'-9" S. 307'-6 1/2"	1'-9"	D	9	1 1/16	8 1/2	9	1 1/16	24	5/8	5/8	5 1/2
B-409	18WF50	308'-9"		C	7	1/2	6 1/2	7	1/2	14	5/16	5/16	3 1/2

NOTES:-

1. N.— Elevation at North end of beam along face of tower spandrel ℄.
   S.— Elevation at South end of beam along line (58).
2. See dwg. 12-JK1-106 & 135 for detail of connection.

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DRAWN S.C.

REVIEWED E.L.

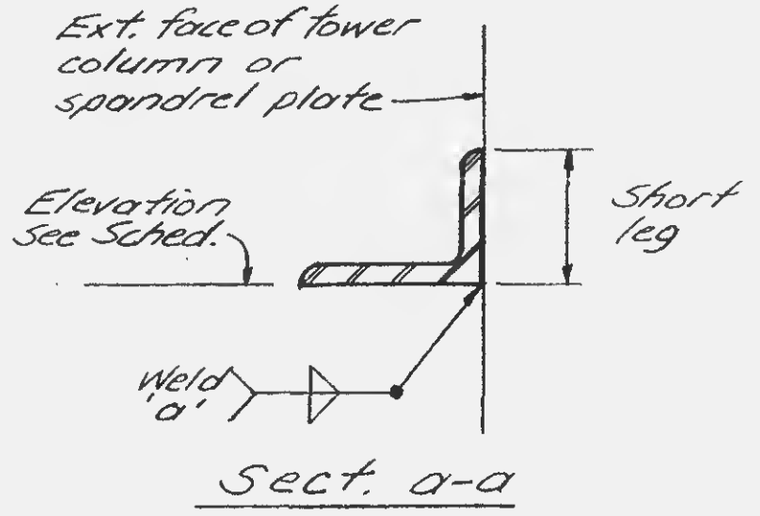
12-JK1-137

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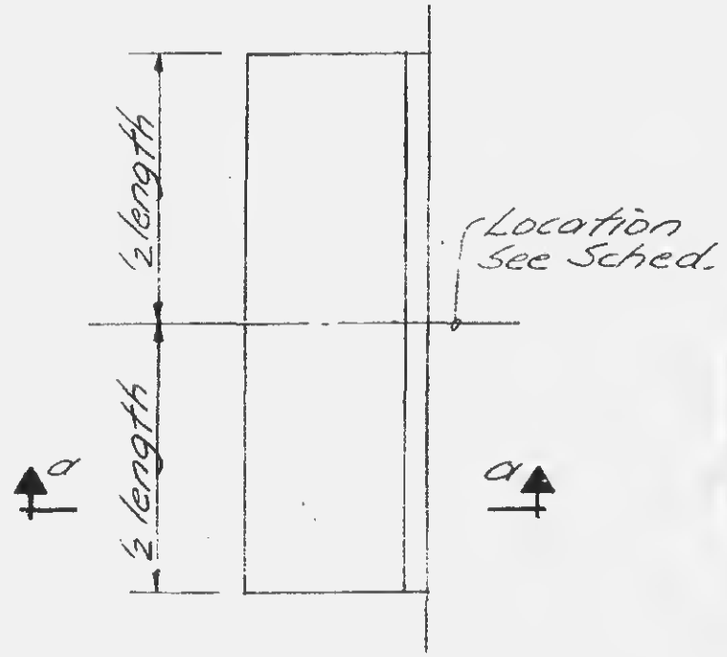
PROJECT: THE WORLD TRADE CENTER | TITLE: BRACKET SUPPORT AT EXT. FACE OF TOWER | DATE: 9-13-68

REVISIONS

	BRACKET SIZE	Fy	LOCATION		ELEV.	WELD 'a'	REMARKS
1	L8x6x1x2'0"	36	WA	N4707'-1"	307'-5"	5/16"	
2	↑	↑	↑	N4712'-6"	↕	↑	
3				N4722'-6"			
4				N4732'-6"			
5				N4741'-3"	307'-5"		
6				N4752'-6"	307'-11"		
7				N4762'-6"	↕		
8				N4781'-3"			
9				N4792'-6"			
10				N4802'-6"			
11				N4812'-6"			
12				N4821'-3"	307'-11"		
13				N4832'-6"	308'-1"		
14				N4842'-6"	↕		
15				N4852'-6"			
16				N4863'-9"			
17	↓	↓	↓	N4872'-6"	308'-1"	↓	
18	L8x6x1x2'0"	36	WA	N4892'-6"	308'-3"	5/16"	



Sect. a-a



PLAN

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NOTES:
1. All welding to be E70XX.
2. * — Longer leg of L vertical.
3. Notations:
   N - North face of tower — A - Tower 'A'
   S - South " " " — B - Tower 'B'
   E - East " " "
   W - West " " "
   Example: WA means West face of Tower 'A'

DESIGNED

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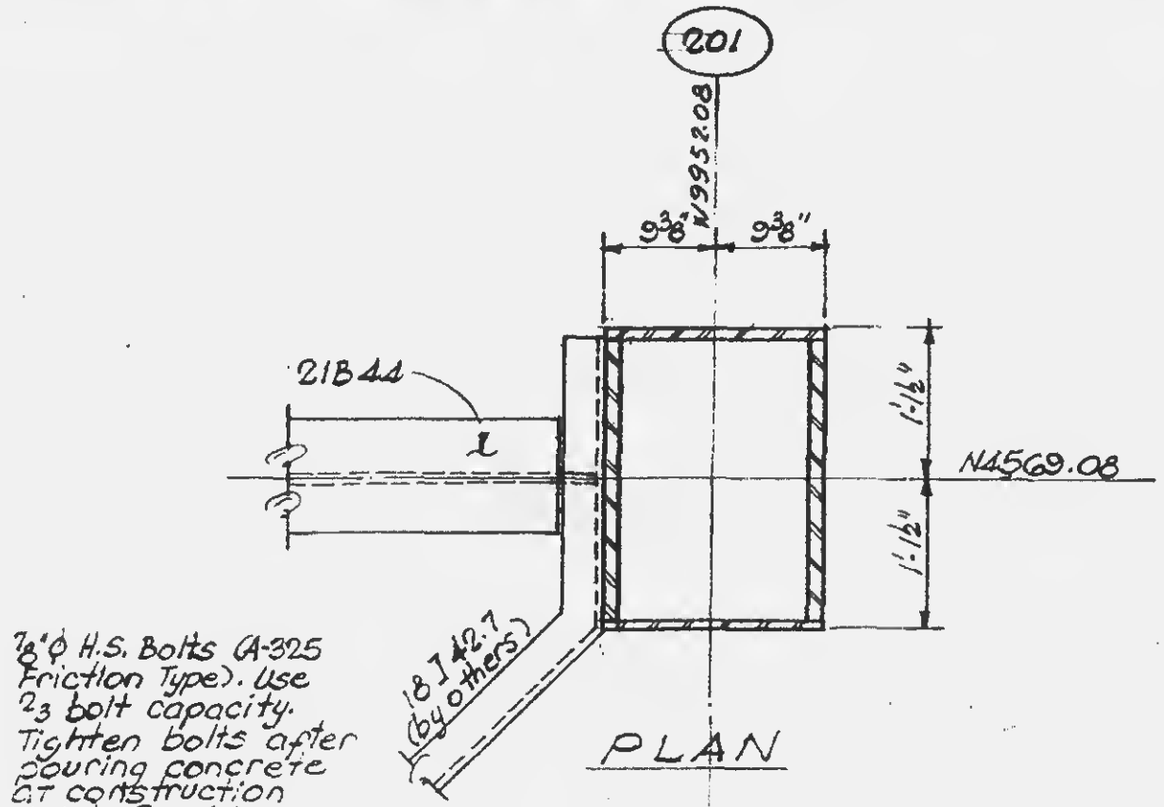
REVIEWED

12-JK1-138

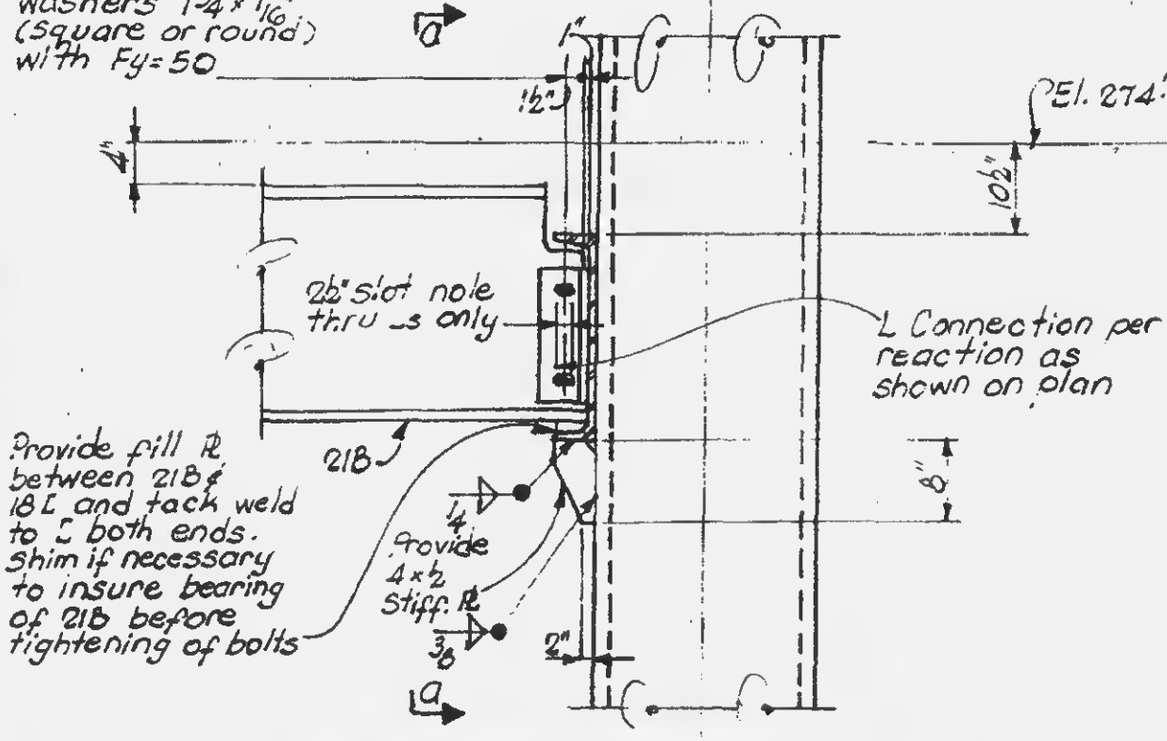
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PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION TO TOWER 'B' | DATE 12-3-68

REVISIONS

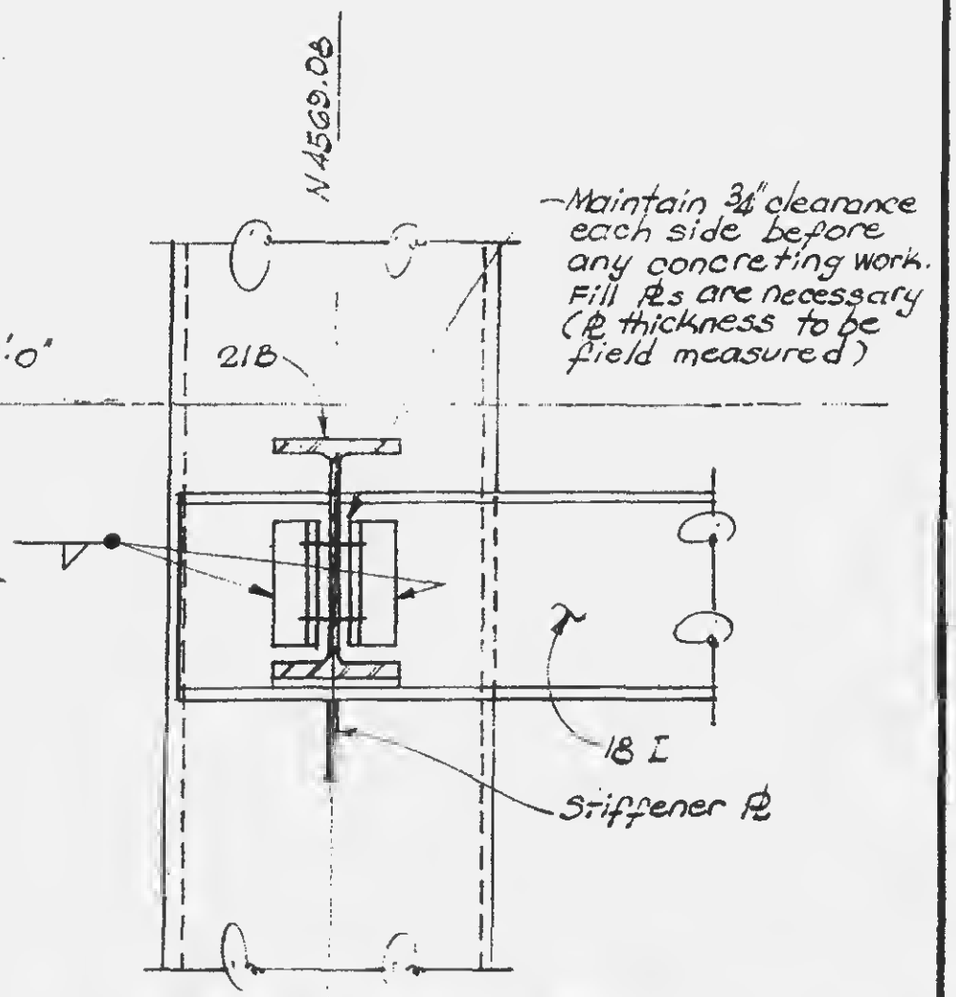


7/8"ϕ H.S. Bolts (A-325 Friction Type). Use 2/3 bolt capacity. Tighten bolts after pouring concrete at construction joint. Provide washers 1¾ × 7/16" (square or round) with Fy=50



Provide fill Pl between 21B & 18 I and tack weld to I both ends. Shim if necessary to insure bearing of 21B before tightening of bolts

ELEVATION



—Maintain ¾" clearance each side before any concreting work. Fill Pls are necessary (Pl thickness to be field measured)

Section a-a

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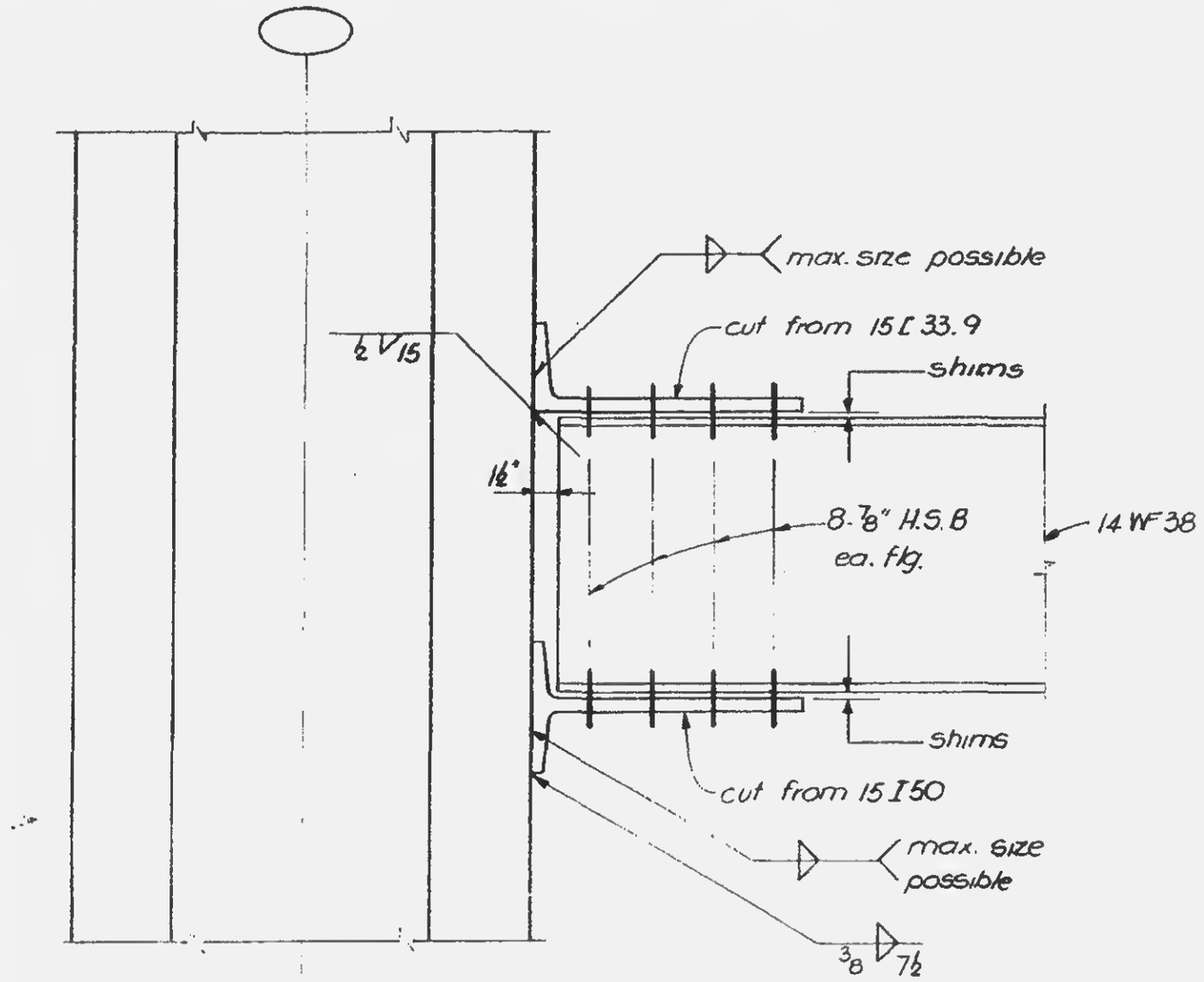
12-JKI-139

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PROJECT: THE WORLD TRADE CENTER — TITLE: BRACKET DETAIL — DATE: 10-15-68

REVISIONS



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G.H.

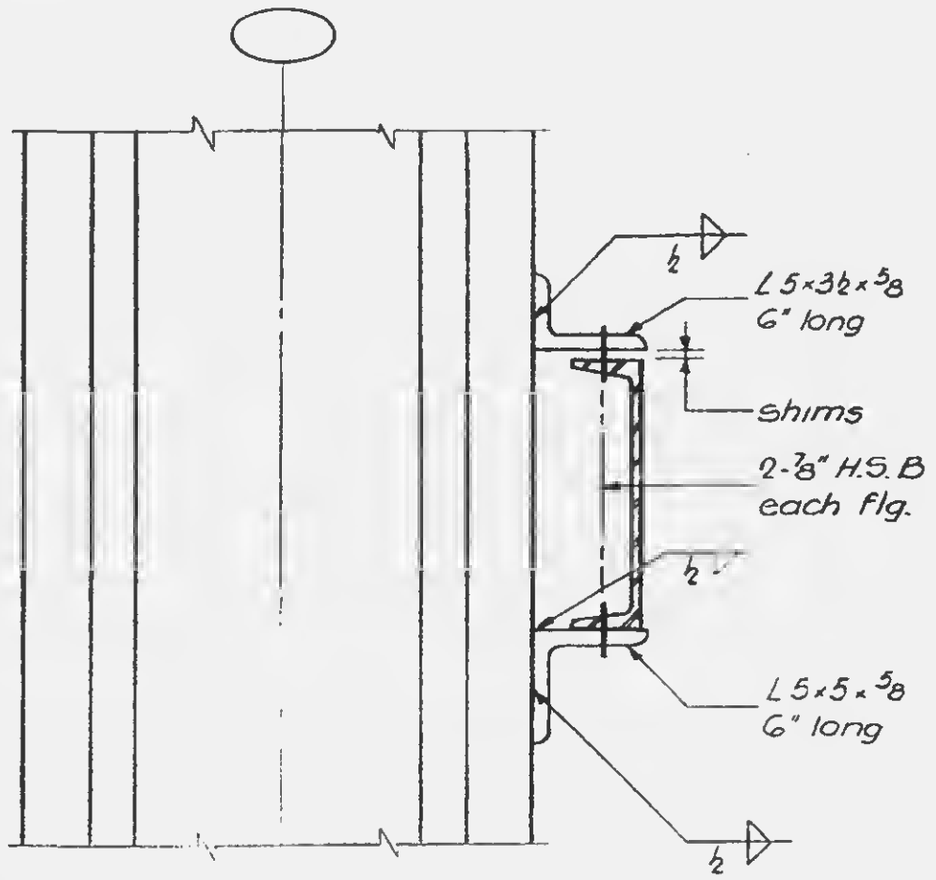
REVIEWED

12-JK1-170

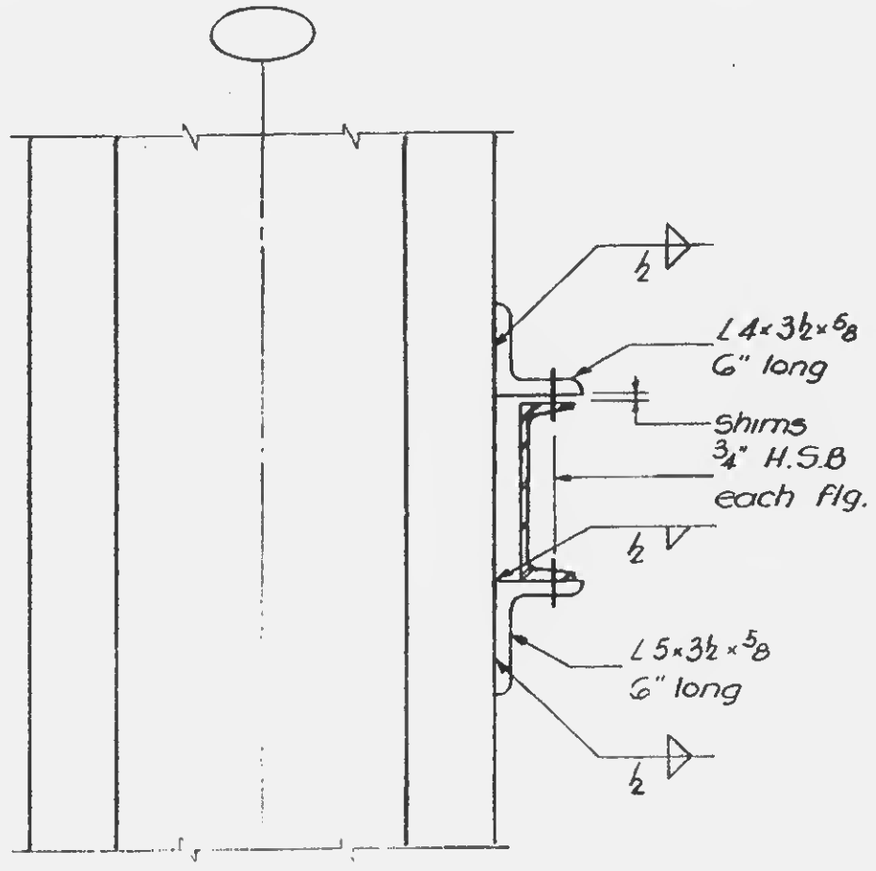
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PROJECT THE WORLD TRADE CENTER | TITLE BRACKET DETAIL | DATE 10-15-68

REVISIONS



Detail A



Detail B

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S.H.

REVIEWED

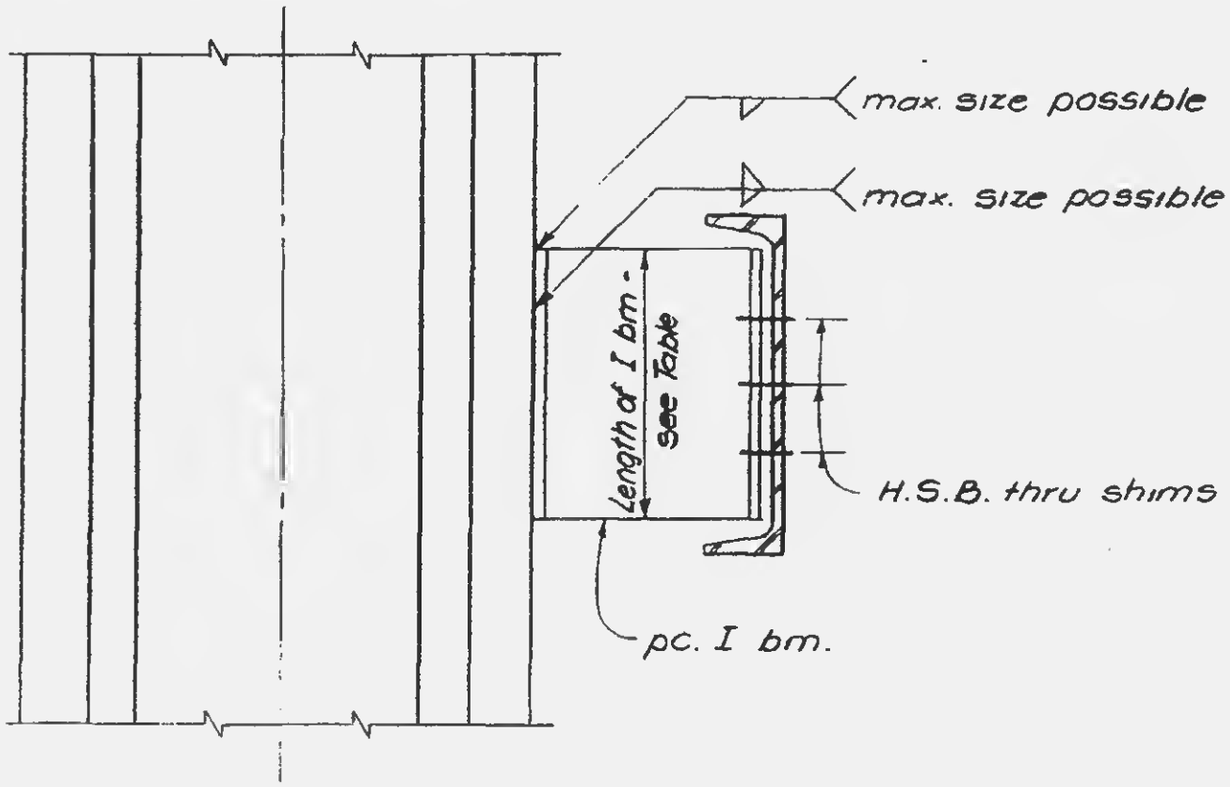
12-JKI-171

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PROJECT THE WORLD TRADE CENTER | TITLE BRACKET DETAIL | DATE 10-15-68

REVISIONS

5-29-69



COL.	SIZE OF BRACKET	LENGTH OF BRACKET	NO. & SIZE OF H.S. BOLTS
K35-6	10 I 35	1'-0"	8-$\frac{3}{4}$" ϕ
K37-5	10 I 35	0'-10"	6-$\frac{3}{4}$" ϕ
K37-7	12 I 50	0'-10"	6-$\frac{3}{4}$" ϕ

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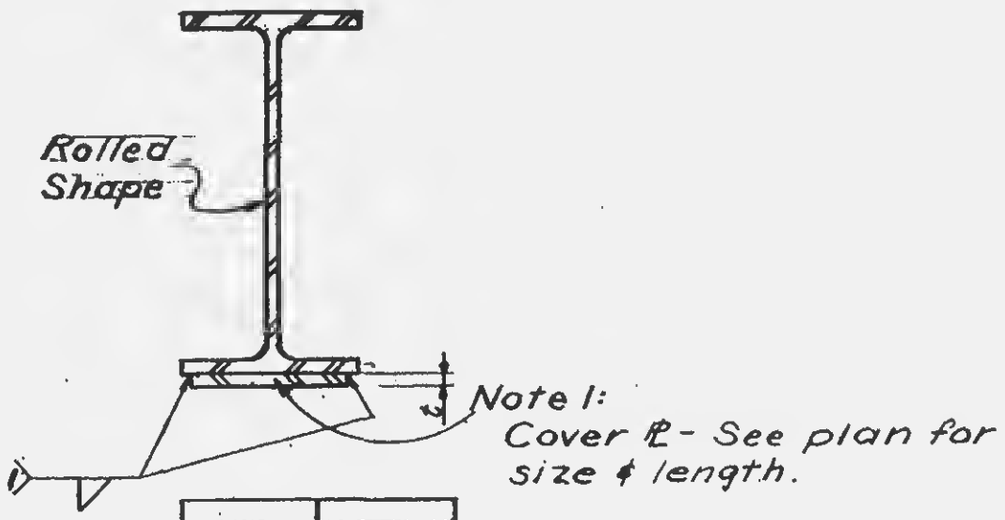
REVIEWED E.L.

12-JK1-172

Civil & Structural Engineers

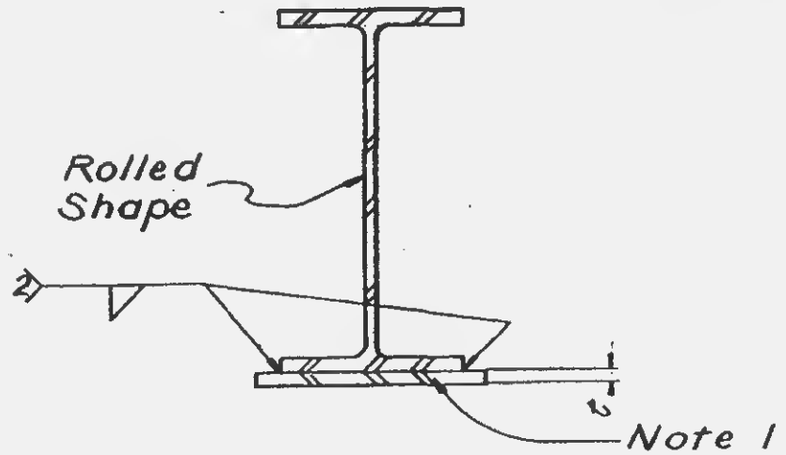
PROJECT THE WORLD TRADE CENTER | TITLE TYPICAL BEAM DETAILS | DATE 5-15-67

REVISIONS
10-20-67
6-7-68
7-19-68



"t"	Weld 1
3/0	1/4
7/16	1/4
1/2	1/4
9/16	5/16
5/0	5/16
11/16	5/16
3/4	5/16
13/16	5/16
7/8	5/16
15/16	5/16
1	5/16
1 1/4	3/8
1 1/2	3/8
1 3/4	3/8
2	1/2

TYPE 2



"t"	Weld 2
3/0	1/4
7/16	1/4
1/2	1/4
9/16	5/16
5/8	5/16
11/16	5/16
3/4	5/16
13/16	5/16
7/8	5/16
15/16	5/16
1	5/16
1 1/4	3/8
1 1/2	3/8
1 3/4	3/8
2	1/2

TYPE 3

Notes:
1. Where 2 cover ℄s are used, thicker ℄ to be welded to Rolled Shape.
Use "t" of thicker ℄ to figure weld size BTW. ℄s (but not greater than thickness of thinner ℄)

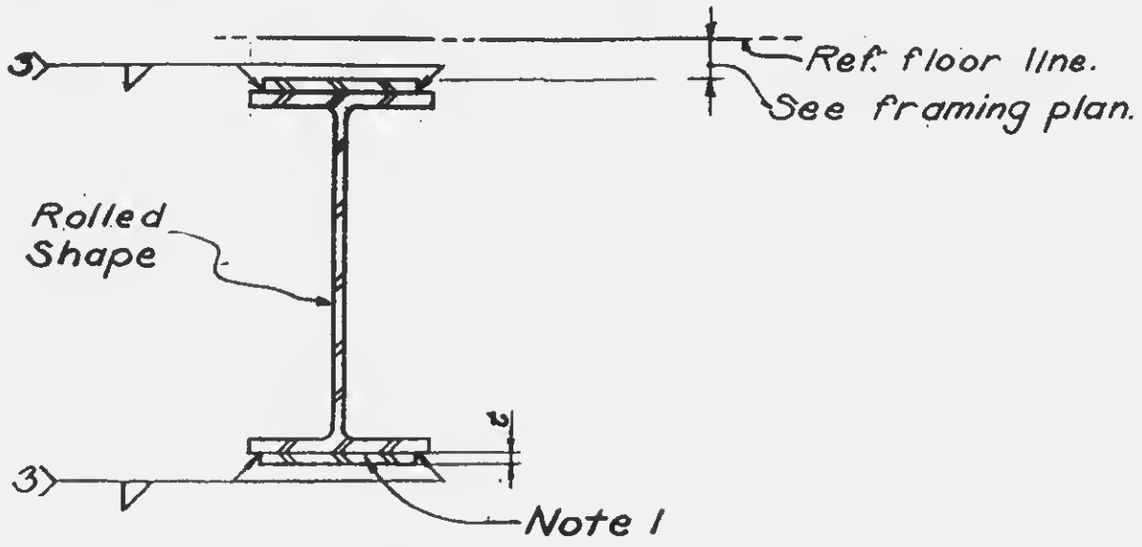
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No. 34360
OF THE STATE OF NEW YORK

12-JK2-2

WORTHINGTON, SKILLING, HELLE & JACKSON — Civil & Structural Engineers

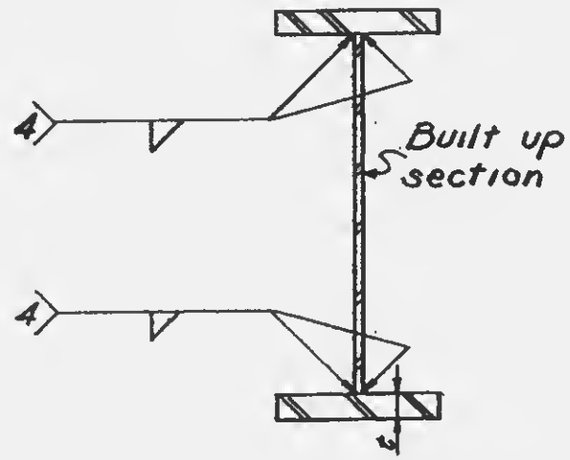
PROJECT: TYPICAL TRADE CENTER | TITLE: TYPICAL BEAM DETAIL | DATE: 5-15-67

REVISIONS
10-20-67
7-19-68



"t"	Weld 3
3/8	1/4
7/16	1/4
1/2	1/4
9/16	5/16
5/8	5/16
11/16	5/16
3/4	5/16
13/16	5/16
7/8	5/16
15/16	5/16
1	5/16
1 1/4	3/8
1 1/2	3/8
1 3/4	3/8
2	1/2

TYPE 4



"t"	Weld 4
3/4	1/4
7/8	5/16
1	5/16
1 1/8	5/16
1 1/4	5/16
1 3/8	5/16
1 1/2	5/16
1 5/8	3/8
1 3/4	3/8
1 7/8	3/8
2	3/8
2 1/4	3/8
2 1/2	1/2
2 3/4	1/2
3	1/2
3 1/4	1/2
3 1/2 or over	1/2

TYPE 5

Notes:
1. Where 2 cover Pls are used, thicker Pl to be welded to Rolled Shape. Use "t" of thicker Pl to figure weld size BTW. Pls (but not greater than thickness of thinner Pl)

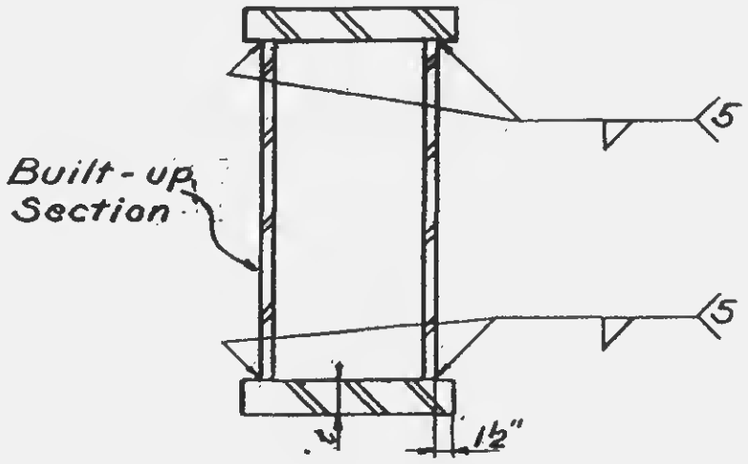
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12-JK2-3

WORTHINGTON, [illegible] & JACKSON — Civil & Structural Engineers

PROJECT	TITLE	DATE
THE WORLD TRADE CENTER	TYPICAL BEAM DETAILS	5 - 15 - 67

REVISIONS



TYPE 6

"t"	WELD 5
3/4	1/4
7/8	5/16
1	5/16
1'0	5/16
1'4	5/16
1'3/8	5/16
1'2	5/16
1'5/8	3/8
1'3/4	3/8
1'7/8	3/8
2	3/8
2'1/4	3/8
2'1/2	1/2
2'3/4	1/2
3	1/2
3'1/4	1/2
3'1/2 or over	1/2

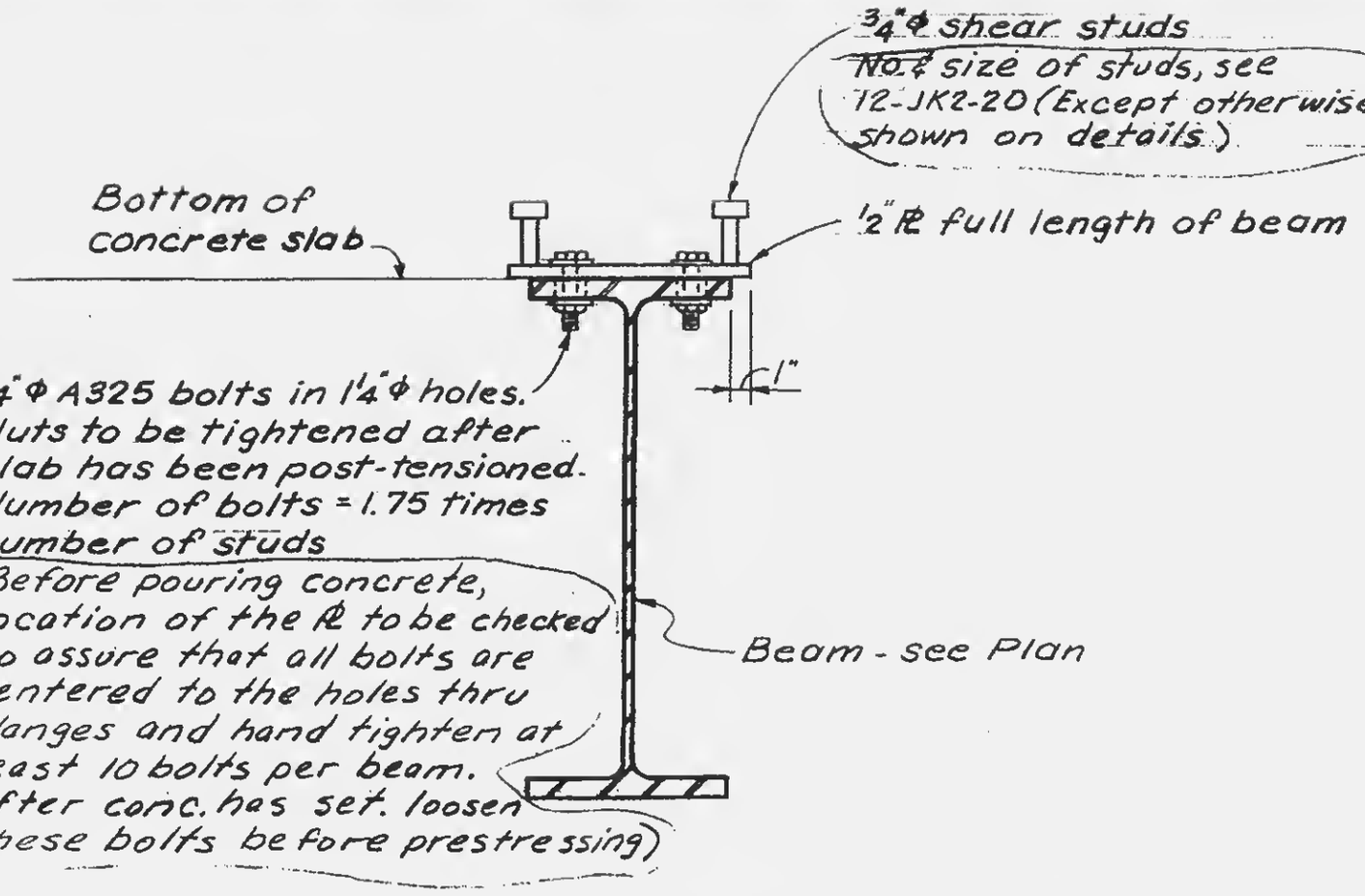
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OF THE STATE OF NEW YORK

12 - JK2 - 4

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE TYPICAL BEAM DETAILS | DATE 5-15-67

REVISIONS
6-5-67
11-8-67
Gen. revisions
7-19-68



TYPE 7 (Typical all beams at El. 264' except otherwise shown on details)

NOTE:
All shear studs shall be installed on 1/2" ℄ only.
All washers provided should be 1 3/4 × 3/16 (square or round) with a yield stress of 50 ksi.

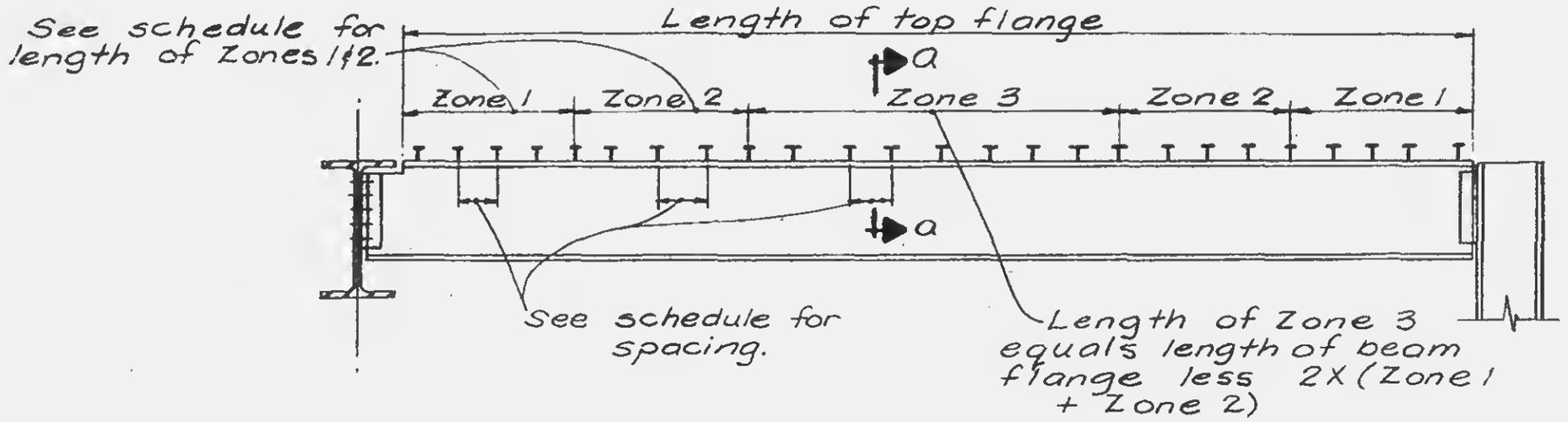
LICENSE LESLIE E. ROBERTSON No. 3882 UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-5

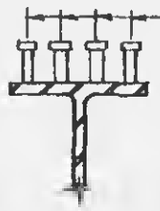
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PROJECT THE WORLD TRADE CENTER | TITLE | DATE 7-19-68

REVISIONS



ELEVATION



SECTION a-a

Notes :

1. Length of beam may be such that Zone 3 does not exist and Zones 2 overlap.

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REVIEWED

12-JK2-8

REVISIONS

[redacted] CENTER

SCHEDULE FOR SHEAR CONNECTORS

[redacted]

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
1	$\frac{3}{4}\phi \times 3"$	4	Length	4'-0"	4'-0"	
			Spacing	$3\frac{3}{4}$"	$3\frac{3}{4}$"	$4\frac{5}{8}$"
2	$\frac{3}{4}\phi \times 3"$	2	Length	4'-0"	4'-0"	
			Spacing	3¼"	3¼"	4"
3	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	4'-0"	4'-0"	
			Spacing	3"	$4\frac{1}{4}$"	$5\frac{3}{4}$"
4	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	4'-0"	4'-0"	
			Spacing	3"	4¼"	6½"
5	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	4	Length	5'-0"	5'-0"	
			Spacing	3¼"	$3\frac{3}{4}$"	$7\frac{3}{4}$"
6	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	5'-0"	5'-0"	
			Spacing	3"	4¼"	8¼"
7	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	4	Length	5'-0"	5'-0"	
			Spacing	4"	$4\frac{3}{4}$"	6
8	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	5'-0"	5'-0"	
			Spacing	3½"	4½"	5½"
9	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	4 & 2	Length	4'-0"	4'-0"	
			Spacing	4@ 4"	2@4½"	2@5½"
10	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length			
			Spacing	9"	9"	9"
11	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	5"	6"	8"
12	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length			
			Spacing	5½"	5½"	5½"
13	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	5'-0"	3'-0"	
			Spacing	3¼"	5"	6½"
14	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	5'-0"	5'-0"	
			Spacing	3"	5"	5"
15	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	$3\frac{3}{4}$"	4½"	7¼"
16	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	4"	$4\frac{3}{4}$"	8"
17	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	5"	$5\frac{3}{4}$	9½"
18	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	$5\frac{3}{4}$"	8¼"	$12\frac{3}{4}$"

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
19	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	$3\frac{3}{4}$"	4¼"	8¼"
20	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	4¼"	5½"	11"
21	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	$6\frac{3}{4}$"	$6\frac{3}{4}$"	8"
22	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	4"	5¼"	9½"
23	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	4½"	5¼"	9½"
24	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	4½"	$5\frac{3}{4}$"	11½"
25	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	4½"	6¼"	10"
26	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	6'-0"	6'-0"	
			Spacing	3½"	$4\frac{3}{4}$"	7¼"
27	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	4'-0"	4'-0"	
			Spacing	$3\frac{3}{4}$"	5"	$6\frac{3}{4}$"
28	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	4'-0"	4'-0"	
			Spacing	3½"	4½"	6"
29	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	4'-0"	4'-0"	
			Spacing	4¼"	5½"	7½"
30	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	4'-0"	4'-0"	
			Spacing	4½"	$5\frac{3}{4}$"	$7\frac{3}{4}$"
31	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	4'-0"	4'-0"	
			Spacing	$3\frac{3}{4}$"	$4\frac{3}{4}$"	6"
32	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	3	Length	4'-0"		
			Spacing	3½"	5½"	5½"
33	$\frac{7}{8}\phi \times 3\frac{1}{2}"$	2	Length	4'-0"		
			Spacing	3¼"	5¼"	5¼"

Note:
See Dwg. 12-JK2-8 for explanation of schedule.

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UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-9

SKIDMORE, OWINGS & MERRILL — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER

TITLE: SCHEDULE FOR SHEAR CONNECTORS

DATE: 2-19-68

REVISIONS

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
34	7/8"φ×3½"	2	Length	4'-0"		
			Spacing	3¼"	5"	5"
35	7/8"φ×3½"	3	Length	4'-0"		
			Spacing	3½"	6"	6"
36	7/8"φ×3½"	2	Length	4'-0"		
			Spacing	3¼"	5½"	5½"
37	7/8"φ×3½"	2	Length			
			Spacing	3¾"	3¾"	3¾"
38	7/8"φ×3½"	3	Length	4'-0"		
			Spacing	3½"	5¾"	5¾"
39	7/8"φ×3½"	2	Length	6'-0"	6'-0"	
			Spacing	5"	7¼"	11"
40	7/8"φ×3½"	3	Length			
			Spacing	3"	3"	3"
41	7/8"φ×3½"	2	Length	5'-0"	5'-0"	
			Spacing	3"	4"	7"
42	7/8"φ×3½"	3	Length	5'-0"	5'-0"	
			Spacing	3¼"	4¼"	6"
43	7/8"φ×3½"	2	Length			
			Spacing	5"	5"	5"
44	7/8"φ×3½"	2	Length	5'-0"		
			Spacing	3¼"	5"	5"
45	7/8"φ×3½"	2	Length	5'-0"		
			Spacing	3¼"	6¼"	6¼"
46	7/8"φ×3½"	2	Length	6'-0"	6'-0"	
			Spacing	3"	4"	6½"
47	7/8"φ×3½"	5	Length	3'-6"		
			Spacing	3¼"	9½"	9½"
48	7/8"φ×3½"	3	Length	6'-0"	5'-0"	
			Spacing	3¼"	5"	8¼"
49	7/8"φ×3½"	5	Length	5'-0"	5'-0"	
			Spacing	3¼"	5"	9"
50	7/8"φ×3½"	5	Length	8'-0"		
			Spacing	3¼"	9½"	9½"
51	7/8"φ×3½"	2	Length			
			Spacing	3"	3"	3"

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
52	7/8"φ×3½"	2	Length	6'-0"	5'-0"	
			Spacing	3¼"	5"	6½"
53	7/8"φ×3½"	2	Length	5'-0"	5'-0"	
			Spacing	3"	4"	6½"
54	7/8"φ×3½"	3	Length	5'-0"	5'-0"	
			Spacing	3"	5"	10"
55	7/8"φ×3½"	4	Length	5'-0"	5'-0"	
			Spacing	3¼"	5½"	10"
56	7/8"φ×3½"	3	Length			
			Spacing	3¼"	3¼"	3¼"
57	7/8"φ×3½"	2	Length	6'-6"		
			Spacing	3¼"	6¼"	6¼"
58	7/8"φ×3½"	3	Length	6'-0"		
			Spacing	3¼"	6½"	6½"
59	7/8"φ×3½"	3	Length	7'-6"		
			Spacing	3¼"	5"	5"
60	7/8"φ×3½"	4	Length	10'-0"		
			Spacing	3¼"	7¾"	7¾"
61	7/8"φ×3½"	3	Length	5'-0"		
			Spacing	3¼"	7½"	7½"
62	7/8"φ×3½"	2	Length	6'-0"	4'-0"	
			Spacing	3¼"	5"	6¼"
63	7/8"φ×3½"	2	Length	5'-0"	4'-0"	
			Spacing	3¾"	5"	6½"
64	7/8"φ×3½"	2	Length	3'-0"	3'-0"	
			Spacing	3"	3¾"	5"
65	7/8"φ×3½"	3	Length	5'-3"	5'-3"	
			Spacing	3¼"	4½"	7¾"
66	7/8"φ×3½"	4	Length	6'-0"	5'-0"	
			Spacing	3¼"	3¾"	7¾"

Note:
See Dwg. 12-JK2-8 for explanation of schedule.

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12-JK2-10

REVISIONS

THE WORCESTER CENTER — SCHEDULE FOR SHEAR CONNECTORS — 5-19-66

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
67	7/8"ϕ×3½"	4	Length	6'-0"	4'-0"	
			Spacing	3¼"	5"	8¾"
68	7/8"ϕ×3½"	3	Length	5'-0"	5'-0"	
			Spacing	3¼"	5"	10"
69	7/8"ϕ×3½"	3	Length	5'-0"		
			Spacing	3¼"	6"	6"
70	7/8"ϕ×3½"	5	Length	5'-0"		
			Spacing	3¼"	10"	10"
71	7/8"ϕ×3½"	3	Length	4'-0"	4'-0"	
			Spacing	3¼"	5"	7¾"
72	7/8"ϕ×3½"	2	Length	4'-6"	3'-6"	
			Spacing	3¼"	4"	6½"
73	7/8"ϕ×3½"	2	Length	6'-0"	6'-0"	
			Spacing	3"	4"	6½"
74	7/8"ϕ×3½"	3	Length	6'-0"	6'-0"	
			Spacing	3¼"	5½"	8¼"
75	7/8"ϕ×3½"	5	Length	6'-0"	5'-0"	
			Spacing	3¼"	5½"	11"
76	7/8"ϕ×3½"	3	Length	6'-0"	6'-0"	
			Spacing	3"	4"	7½"
77	7/8"ϕ×3½"	5	Length	4'-0"		
			Spacing	3¼"	9½"	9½"
78	7/8"ϕ×3½"	2	Length	6'-0"		
			Spacing	3"	10"	10"
79	7/8"ϕ×3½"	3	Length	6'-0"		
			Spacing	3¼"	4¼"	4¼"
80	7/8"ϕ×3½"	2	Length	6'-0"		
			Spacing	3"	8¼"	8¼"
81	7/8"ϕ×3½"	3	Length	6'-6"	5'-0"	
			Spacing	3¼"	5"	8¼"
82	7/8"ϕ×3½"	5 & 3	Length	6'-0"		
			Spacing	5@3¼"	3@4"	3@4"
83	7/8"ϕ×3½"	2	Length			
			Spacing	4½"	4½"	4½"
84	7/8"ϕ×3½"	3	Length	6'-0"	4'-0"	
			Spacing	4"	5¼"	7¼"

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
85	7/8"ϕ×3½"	3	Length	6'-0"	4'-0"	
			Spacing	4"	5½"	8½"
86	7/8"ϕ×3½"	3	Length	6'-0"	4'-0"	
			Spacing	4¾"	5½"	13"
87	7/8"ϕ×3½"	4	Length	6'-0"	4'-0"	
			Spacing	3¼"	4¼"	6"
88	7/8"ϕ×3½"	4	Length	6'-0"	4'-0"	
			Spacing	3¼"	3½"	7½"
89	7/8"ϕ×3½"	4	Length	6'-0"	4'-0"	
			Spacing	3"	4¼"	7"
90	7/8"ϕ×3½"	4	Length	6'-0"	4'-0"	
			Spacing	3"	4"	6"
91	7/8"ϕ×3½"	4	Length	6'-0"	4'-0"	
			Spacing	3¾"	4¾"	6"
92	7/8"ϕ×3½"	4	Length	6'-0"		
			Spacing	3"	5"	5"
93	7/8"ϕ×3½"	4	Length	6'-0"		
			Spacing	3"	4½"	4½"
94	7/8"ϕ×3½"	4	Length	6'-0"		
			Spacing	3¼"	5¼"	5¼"
95	7/8"ϕ×3½"	4	Length	6'-0"		
			Spacing	3¾"	5¼"	5¼"
96	7/8"ϕ×3½"	5	Length	6'-0"	4'-0"	
			Spacing	3¼"	4½"	7"
97	7/8"ϕ×3½"	2	Length			
			Spacing	4"	4"	4"
98	7/8"ϕ×3½"	2	Length			
			Spacing	5¼"	5¼"	5¼"
99	7/8"ϕ×3½"	3	Length			
			Spacing	3½"	3½"	3½"

Note:
See Dwg. 12-JK2-8 for explanation of schedule.

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REVISIONS

THE ROBERTSON CENTER | SCHEDULE FOR SHEAR CONNECTORS | 7-19-68

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
100	7/8"φ×3½"	3	Length			
			Spacing	4½"	4½"	4½"
101	7/8"φ×3½"	2	Length	4'-0"		
			Spacing	4"	7½"	7½"
102	7/8"φ×3½"	2	Length	7'-6"		
			Spacing	4"	7½"	7½"
103	7/8"φ×3½"	2	Length	6'-0"		
			Spacing	3"	6"	6"
104	7/8"φ×3½"	2	Length	7'-6"		
			Spacing	3"	4½"	4½"
105	7/8"φ×3½"	2	Length	6'-0"	4'-0"	
			Spacing	4"	6"	7½"
106	7/8"φ×3½"	2	Length	5'-0"	5'-0"	
			Spacing	3"	4"	5½"
107	7/8"φ×3½"	2	Length	6'-0"	6'-0"	
			Spacing	5"	7½"	10½"
108	7/8"φ×3½"	3	Length	10'-0"		
			Spacing	3"	7"	7"
109	7/8"φ×3½"	3	Length	5'-0"		
			Spacing	4"	9"	9"
110	7/8"φ×3½"	3	Length	5'-0"		
			Spacing	5"	6"	6"
111	7/8"φ×3½"	3	Length	10'-0"		
			Spacing	5"	6"	6"
112	7/8"φ×3½"	3	Length	5'-0"		
			Spacing	3"	15"	15"
113	7/8"φ×3½"	3	Length	5'-0"		
			Spacing	3½"	10½"	10½"
114	7/8"φ×3½"	3	Length	6'-0"	5'-0"	
			Spacing	3"	3½"	7"
115	7/8"φ×3½"	3	Length	6'-0"	4'-0"	
			Spacing	3"	4½"	8"
116	7/8"φ×3½"	3	Length	5'-0"	5'-0"	
			Spacing	4	6'	2"
117	7/8"φ×3½"	4	Length	5'-0"		
			Spacing	3"	16"	16"

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
118	7/8"φ×3½"	4	Length	5'-0"	5'-0"	
			Spacing	3"	9"	12"
119	7/8"φ×3½"	2	Length	5'-0"		
			Spacing	3"	5¾"	5¾"
			Length			
			Spacing			
			Length			
			Spacing			
			Length			
			Spacing			
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			Spacing			
			Length			
			Spacing			

Note:
See Dwg. 12-JK2-8 for explanation of schedule.

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SCHEDULE FOR SHEAR CONNECTORS

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
120	7/8"ϕ×3½"	4	Length	12'-0"		
			Spacing	4"	10½"	10½"
121		3	Length	7'-0"		
			Spacing	3½"	18"	18"
122		3	Length	6'-0"	5'-0"	
			Spacing	3½"	9"	12"
123 (see note 2)		4	Length	6'-0"	4'-0"	
			Spacing	3"	4"	8¼"
124 (see note 2)		5	Length	6'-0"	4'-0"	
			Spacing	3"	4¼"	7"
125 (see note 2)		7	Length	6'-0"	4'-0"	
			Spacing	3"	4"	6¾"
126		5	Length	6'-0"	4'-0"	
			Spacing	3"	4"	6"
127		3	Length	6'-0"	4'-0"	
			Spacing	3½"	6¾"	6¾"
128		2	Length	6'-0"	4'-0"	
			Spacing	4"	7"	7"
129		3	Length	6'-0"	4'-0"	
			Spacing	4"	5½"	9"
130		4	Length	6'-0"	4'-0"	
			Spacing	3"	8¼	6'4"
131		5	Length	6'-0"	4'-0"	
			Spacing	3"	4¼"	6½"
132		6	Length	6'-0"	4'-0"	
			Spacing	3"	5¼"	8¾"
133		2	Length	6'-0"		
			Spacing	3"	6¼"	6¼"
134		3	Length	6'-0"	4'-0"	
			Spacing	4"	5"	8¼"
135		2	Length	6'-0"	6'-0"	
			Spacing	3"	4"	6¼"
136		2	Length	6'-0"	4'-0"	
			Spacing	3¼"	5"	6¼"
137	7/8"ϕ×3½"	2	Length	4'-0"	6'-0"	
			Spacing	4"	5½"	12"

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
138	7/8"ϕ×3½"	2	Length	4'-0"	6'-0"	
			Spacing	3¾"	5¾"	15"
139		4	Length	4'-0"	6'-0"	
			Spacing	4¼"	7¾"	16"
140		4	Length	4'-0"	6'-0"	
			Spacing	3½"	5"	13"
141		4	Length	5'-0"		
			Spacing	5¾"		
142		2	Length	4'-0"	6'-0"	—
			Spacing	3¼"	4½"	12¼"
143		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4¾"	12½"
144		2	Length	4'-0"	6'-0"	
			Spacing	3½"	5"	11"
145		2	Length	4'-0"	6'-0"	
			Spacing	3¾"	5½"	13¼"
146		2	Length	4'-0"	6'-0"	
			Spacing	3½"	5"	12¼"
147		2	Length	4'-0"	6'-0"	
			Spacing	3½"	4¾"	10¾"
148		2	Length	4'-0"	6'-0"	
			Spacing	5½"	8"	20"
149		2	Length	4'-0"	6'-0"	
			Spacing	5½"	8¾"	8¾"
150		2	Length	4'-0"	6'-0"	
			Spacing	4¾"	6¾"	18"
151		2	Length	4'-0"	6'-0"	
			Spacing	5"	8½"	
152	7/8"ϕ×3½"	2	Length	4'-0"	6'-0"	
			Spacing	4¾"	8"	

Notes:

1. See Dwg. 12-JK2-8 for explanation of schedule.
2. Length of stud spacing is between columns. Cantilever portion has no studs.

LEROY E. ROBERTSON — No. 34360 — UNIVERSITY OF NEW YORK

12-JK2-13

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: SCHEDULE FOR SHEAR CONNECTORS | DATE: 11-5-68

REVISIONS

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
153	7/8"ϕ x 3½"	2	Length	4'-0"	6'-0"	
			Spacing	4½"	7¾"	
154		4	Length	4'-0"	6'-0"	
			Spacing	5"	6¾"	15"
155		4	Length	4'-0"	6'-0"	
			Spacing	4½"	7½"	13½"
156		2	Length	4'-0"	6'-0"	
			Spacing	5"	7"	15"
157		4	Length	4'-0"	6'-0"	
			Spacing	5¾"	7¾"	17"
158		2	Length	4'-0"	6'-0"	
			Spacing	3¾"	5¾"	21"
159		2	Length	4'-0"	6'-0"	
			Spacing	3¾"	6¼"	
160		2	Length	4'-0"	6'-0"	
			Spacing	4¼"	6¼"	16"
161		2	Length	4'-0"	6'-0"	
			Spacing	3"	4"	9"
162		4	Length	4'-0"	6'-0"	
			Spacing	4¾"	6½"	14½"
163		4	Length	4'-0"	6'-0"	
			Spacing	4"	5¼"	17½"
164		4	Length	4'-0"	6'-0"	
			Spacing	5¼"	7½"	22"
165		2	Length	4'-0"	6'-0"	
			Spacing	3½"	5½"	5½"
166		4	Length	4'-0"	6'-0"	
			Spacing	5"	7"	16½"
167		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4¾"	14"
168		4	Length	4'-0"	6'-0"	
			Spacing	3"	4¼"	9½"
169		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4¾"	10¼"
170	7/8"ϕ x 3½"	2	Length	4'-0"	6'-0"	
			Spacing	3½"	4¾"	10¾"

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
171	7/8"ϕ x 3½"	2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4¾"	12¼"
172		2	Length	4'-0"	6'-0"	
			Spacing	3½"	4½"	10"
173		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4½"	10"
174		2	Length	4'-0"	6'-0"	
			Spacing	3¾"	5"	11"
175		2	Length	4'-0"	6'-0"	
			Spacing	4¾"	6½"	14¼"
176		4	Length	4'-0"	6'-0"	
			Spacing	4¼"	6"	13"
177		2	Length	4'-0"	6'-0"	
			Spacing	3¾"	5¼"	13½"
178		2	Length	4'-0"	6'-0"	
			Spacing	4½"	6¼"	13¾"
179		2	Length	4'-0"	6'-0"	
			Spacing	3½"	5"	11"
180		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4½"	10"
181		4	Length	4'-0"	6'-0"	
			Spacing	4½"	6"	13¼"
182		4	Length	4'-0"	6'-0"	
			Spacing	4½"	6"	13½"
183		2	Length	4'-0"	6'-0"	
			Spacing	3¾"	5"	9¾"
184		2	Length	4'-0"	6'-0"	
			Spacing	4¼"	6"	13"
185	7/8"ϕ x 3½"	6	Length	4'-0"	6'-0"	
			Spacing	3¾"	5¼"	11½"

Notes:

1. See Dwg. 12-JK2-8 for explanation of schedule.

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — STATE OF NEW YORK

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12-JK2-14

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: SCHEDULE FOR SHEAR CONNECTORS | DATE: 11-5-68

REVISIONS

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
186	7/8"ϕ x 3½"	4	Length	4'-0"	6'-0"	
			Spacing	4¾"	6½"	14"
187		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4½"	10"
188		2	Length	5'-6"		
			Spacing	3¼"		
189		4	Length	4'-0"	6'-0"	
			Spacing	5¾"	7¾"	15½"
190		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4½"	9"
191		2	Length	4'-0"	6'-0"	
			Spacing	3"	4"	8½"
192		4	Length	4'-0"	6'-0"	
			Spacing	5¼"	7½"	19¾"
193		4	Length	4'-0"	6'-0"	
			Spacing	5"	6¾"	14½"
194		4	Length	4'-0"	6'-0"	
			Spacing	5¼"	7¼"	16"
195		2	Length	4'-0"	6'-0"	
			Spacing	3¾	5"	11"
196		4	Length	4'-0"	6'-0"	
			Spacing	3¾"	5"	11"
197		4	Length	4'-0"	6'-0"	
			Spacing	5½"	7½"	16¼"
198		4	Length	4'-0"	6'-0"	
			Spacing	5¾"	7¾"	17"
199		4	Length	4'-0"	3'-0"	
			Spacing	4¾"	11"	
200		2	Length	4'-0"	6'-0"	
			Spacing	3½"	5"	11"
201		4	Length	4'-0"	6'-0"	
			Spacing	3¾"	5¼	10¾"
202		4	Length	4'-0"	6'-0"	
			Spacing	5¼"	7¼"	16"
203	7/8"ϕ x 3½"	4	Length	4'-0"	6'-0"	
			Spacing	3¾"	5¼"	14½"

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
204	7/8"ϕ x 3½"	4	Length	4'-0"	6'-0"	
			Spacing	5"	8½"	
205		2	Length	4'-0"		
			Spacing	3"	9"	
206		2	Length	4'-0"	6'-0"	
			Spacing	3"	4"	8"
207		2	Length	4'-0"	6'-0"	
			Spacing	4¼"	5¾"	11"
208		4	Length	4'-0"	5'-0"	
			Spacing	5¾"	10½"	
209		2	Length	4'-0"	3'-5"	
			Spacing	4¾"	10"	
210		2	Length	4'-0"	6'-0"	
			Spacing	3"	4"	7½"
211		2	Length	4'-0"	6'-0"	
			Spacing	3"	4"	8½"
212		2	Length	4'-0"	6'-0"	
			Spacing	4¼	5½"	9"
213 (See dwg 12-JK-160)		2	Length	4'-0"	6'-0"	
			Spacing	4	5¼	12
214		4	Length	4'-0"	6'-0"	
			Spacing	4¼"	6"	13"
215		4	Length	4'-0"	6'-0"	
			Spacing	5½"	7½"	16½"
216		4	Length	4'-0"	6'-0"	
			Spacing	5"	7¾	24
217		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	3¾"	6¼
218	7/8"ϕ x 3½"	4	Length	4'-0"	6'-0"	
			Spacing	4¼	5¾"	21"

Notes:

1. See Dwg. 12-JK2-8 for explanation of schedule.

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12-JK2-15

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: SCHEDULE FOR SHEAR CONNECTORS | DATE: 11-5-68

REVISIONS

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
219	7/8"ϕ x 3½"	4	Length	4'-0"	6'-0"	
			Spacing	5"	7"	15"
220		2	Length	4'-0"	6'-0"	
			Spacing	3¾"	5"	11¼"
221		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4¾"	19½"
222		2	Length	4'-0"	6'-0"	
			Spacing	3"	4"	6¼"
223		2	Length	4'-0"	6'-0"	
			Spacing	4"	6¼"	24"
224		4	Length	4'-0"	6'-0"	
			Spacing	5½"	7"	11¾"
225		6	Length	4'-0"	6'-0"	
			Spacing	4"	4¾"	7½"
226		2	Length	4'-0"	6'-0"	
			Spacing	3¾"	5¼"	11¾"
227		4	Length	4'-0"	6'-0"	
			Spacing	5"	7"	16½"
228		4	Length	4'-0"	6'-0"	
			Spacing	4¼"	5¾"	12¾"
229		4	Length	4'-0"	6'-0"	
			Spacing	4¾"	6½"	14"
230		6	Length	4'-0"	6'-0"	
			Spacing	4¼"	6"	12¼
231		2	Length	4'-0"	6'-0"	
			Spacing	5½"	7½"	17"
232		4	Length	4'-0"	6'-0"	
			Spacing	5"	7¼"	16"
233		4	Length	4'-0"	6'-0"	
			Spacing	4"	5"	8½"
234		4	Length	4'-0"	6'-0"	
			Spacing	3"	4¼"	8¼"
235		4	Length	4'-0"	6'-0"	
			Spacing	4¾"	6½"	12½"
236	7/8"ϕ x 3½"	2	Length	4'-0"	6'-0"	
			Spacing	3"	4¼"	9½"

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
237	7/8"ϕx3½"	2	Length	4'-0"	6'-0"	
			Spacing	3½"	4½"	7½"
238		4	Length	4'-0"	6'-0"	
			Spacing	5"	7"	17"
239		2	Length	4'-0"	6'-0"	
			Spacing	5¼"	7¼"	16"
240		4	Length	4'-0"	6'-0"	
			Spacing	3¾"	4¾"	7"
241		2	Length	4'-0"	6'-0"	
			Spacing	4½"	5¼"	7"
242		4	Length	4'-0"	6'-0"	
			Spacing	3"	4"	8"
243		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4½"	8¾"
244		2	Length	4'-0"	6'-0"	
			Spacing	4"	6"	24"
245		2	Length	4'-0"	6'-0"	
			Spacing	3½"	4¾"	10½"
246		4	Length	4'-0"	6'-0"	
			Spacing	5½"	7½"	16½"
247		2	Length	4'-0"	6'-0"	
			Spacing	4¼"	5"	6½"
248		4	Length	4'-0"	6'-0"	
			Spacing	3½"	5"	11"
249		2	Length	4'-0"	6'-0"	
			Spacing	3½"	4½"	8"
250		4	Length	4'-0"	6'-0"	
			Spacing	3"	5½"	
251	7/8"ϕ x3½	2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4¾"	11"

Notes:

1. See Dwg. 12-JK2-8 for explanation of schedule.

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12-JK2-16

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: SCHEDULE FOR SHEAR CONNECTORS | DATE: 11-5-68

REVISIONS

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
252	7/8"ϕ x 3½"	4	Length	4'-0"	6'-0"	
			Spacing	5"	7"	16½"
253		4	Length	4'-0"	6'-0"	
			Spacing	3¼"	4½"	12½"
254		4	Length	4'-0"	6'-0"	
			Spacing	5½"	7¾"	18"
255		4	Length	4'-0"	6'-0"	
			Spacing	3¾"	5¼"	13½"
256		4	Length	4'-0"	6'-0"	
			Spacing	4½"	6"	15¾"
257		6	Length	4'-0"	6'-0"	
			Spacing	4¼"	5"	7¾"
258		4	Length	4'-0"	6'-0"	
			Spacing	3¼"	4"	5¾"
259		4	Length	4'-0"	6'-0	
			Spacing	3½"	4¼	7¼"
260		4	Length	4'-0"	6'-0"	
			Spacing	4½"	6'	12"
261		4	Length	4'-0"	6'-0"	
			Spacing	5¼"	7"	13½"
262		4	Length	4'-0"	6'-0"	
			Spacing	5"	6¾"	16½"
263		4	Length	4'-0"	6'-0"	
			Spacing	5¾"	7¾"	18½"
264		4	Length	4'-0"	6'-0"	
			Spacing	4¾	6½"	15"
265		4	Length	4'-0"	6'-0"	
			Spacing	4¾	6½"	16"
266		2	Length	4'-0"	6'-0"	
			Spacing	4"	5½"	14½"
267		2	Length	4'-0"	6'-0"	
			Spacing	4½	6½"	16½"
268		2	Length	4'-0"	6'-0"	
			Spacing	3"	4¼	9½"
269	7/8"ϕ x 3½"	2	Length	4'-0"	6'-0	
			Spacing	5¼	7¼	19"

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
270	7/8"ϕ x 3½"	2	Length	4'-0"	6'-0"	
			Spacing	6"	8"	18"
271		2	Length	4'-0"	6'-0"	
			Spacing	5¼"	7"	15¾"
272		2	Length	4'-0"	6'-0"	
			Spacing	5¼"	7¼"	16"
273		2	Length	4'-0"	6'-0"	
			Spacing	6¼"	8½"	19"
274		4	Length	4'-0"	6'-0"	
			Spacing	3"	4"	9"
275		2	Length	4'-0"	6'-0"	
			Spacing	3¼"	4½"	10"
276		2	Length	4'-0	6'-0"	
			Spacing	4½	6¼"	13½
277		2	Length	4'-0"	6'-0	
			Spacing	3¼	5¾	
278		4	Length	4'-0"	6'-0"	
			Spacing	5"	8¾"	
279		2	Length	4'-0"	6'-0"	
			Spacing	4¼	10	
280		4	Length	4'-0"	6'-0"	
			Spacing	4½"	6¾	23"
281		2	Length	4'-0"	6'-0"	
			Spacing	3½	5½	
282		4	Length	4'-0"	6'-0	
			Spacing	5¼	5¼	
283		2	Length	4'-0	6'-0	
			Spacing	3½		
284	7/8"ϕ x 3½"	2	Length	4'-0"	6'-0"	
			Spacing	3½	5½"	5½

Notes:

1. See Dwg. 12-JK2-8 for explanation of schedule.

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12-JK2-17

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER

TITLE: SCHEDULE FOR SHEAR CONNECTORS

DATE: 11-5-68

REVISIONS

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
285	7/8"ϕx3½"	2	Length	4'-0"	6'-0"	
			Spacing	4½"	7¾"	
286		2	Length	5'-0"		
			Spacing	7½"		
287		2	Length	4'-0"	6'-0"	
			Spacing	7¼"	9¾"	21½"
288		2	Length	4'-0"	3'-0"	
			Spacing	3¾"	8¾"	
289		2	Length	4'-0"	3'-0"	
			Spacing	5"	11¾"	
290		2	Length	4'-0"	6'-0"	
			Spacing	4½"	7½"	
291		2	Length	4'-0"	3'-0"	
			Spacing	6"	13½"	
292		2	Length	4'-0"	3'-5"	
			Spacing	4"	8¾"	
293		2	Length	4'-0"	6'-0"	
			Spacing	4"	6½"	
294		2	Length	4'-0"	6'-0"	
			Spacing	5¾"	9½"	
295		2	Length	4'-0"	6'-0"	
			Spacing	4½"	6"	13½
296		2	Length	4'-0"	6'-0"	
			Spacing	3"	4"	9"
297		2	Length	4'-0"	6'-0"	
			Spacing	5¾"	8"	17½"
298		4	Length	4'-0"	6'-0"	
			Spacing	3½"	5"	11"
299		2	Length	4'-6"		
			Spacing	4¾"		
70[illegible]		4	Length	4'-0"	6'-0"	
			Spacing	4¾"	7¼"	24"
[illegible]		[illegible]	Length	4'-0"	6'-0"	
			Spacing	5¾"	8¼	22"
[illegible]	7/8"ϕx3½"	2	Length	4'-0	4'-0"	
			Spacing	3¾"	7½"	

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
704	7/8"ϕx3½"	2	Length	4'-0"	5'-0"	
			Spacing	4¼"	7¾"	
705		4	Length	4'-0"		
			Spacing	5¼"	12"	
706		4	Length	4'-0"		
			Spacing	4¼"	10"	
707		2	Length	4'-0"	3'-0"	
			Spacing	5½"	12½"	
708		2	Length	4'-0"		
			Spacing	6¾"	12½"	
709		3	Length	4'-0"	6'-0"	
			Spacing	3½"	5¾"	
710		2	Length	4'-0"	6'-0"	
			Spacing	4"	6¾"	
711		2	Length	4'-6"		
			Spacing	4"		
712		2	Length	4'-0"		
			Spacing	5¼"		
713		4	Length	4'-0"		
			Spacing	4¾"		
714		2	Length	4'-0"	6'-0"	
			Spacing	5"	8¼	24
715		2	Length	4'-0"		
			Spacing	9¾	9¾	
716		2	Length	4'-0	6'-0"	
			Spacing	3¾	6½"	
717		2	Length	4'-0"		
			Spacing	6¾		
718		2	Length	4'-0"	6'-0"	
			Spacing	5¾"	8"	19"
719		2	Length	4'-0"		
			Spacing	7¾"	22"	
720	7/8"ϕx3½"	4	Length	4'-0"	6'-0"	
			Spacing	4¾"	6½"	14"

Notes:

1. See Dwg. 12-JK2-8 for explanation of schedule.

12 - JK2 - 17A

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PROJECT: THE WORLD TRADE CENTER | TITLE: SCHEDULE FOR SHEAR CONNECTORS | REF. 12-JK2-6B

REVISIONS
4-18-69
4-14-70

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
721	3/4"ϕ×3"	4	Length	5'-0"	5'-0"	
			Spacing	3½"	4¼"	7"
722	3/4"ϕ×3"	4	Length	5'-0"		
			Spacing	3½"	5¼"	
723	7/8"ϕ×3½"	2	Length	5'-0"	5'-0"	
			Spacing	4½"	6"	9"
724	7/8"ϕ×3½"	3	Length	5'-6"	5'-6"	
			Spacing	3"	5"	12"
725	7/8"ϕ×3½"	3	Length	5'-0"	5'-0"	
			Spacing	4½"	6"	8"
726	7/8"ϕ×3½"	2	Length	5'-0"	5'-0"	
			Spacing	8"	12"	12"
727	7/8"ϕ×3½"	3	Length	5'-6"	5'-6"	
			Spacing	4"	5½"	7"
728	7/8"ϕ×3½"	3	Length	4'-0"	6'-0"	
			Spacing	8"	10"	12"
729	7/8"ϕ×3½"	3	Length	5'-3"	5'-3"	
			Spacing	4½"	7½"	8"
730	7/8"ϕ×3½"	3	Length	6'-0"	6'-0"	
			Spacing	5"	8½"	12"
731	7/8"ϕ×3½"	4	Length	2'-0"		
			Spacing	3"	9"	
732	7/8"ϕ×3½"	4	Length	4'-0"	6'-0"	
			Spacing	3"	4½"	9"
733	7/8"ϕ×3½"	3	Length	4'-0"	6'-0"	
			Spacing	3"	4½"	8"
734	7/8"ϕ×3½"	3	Length	4'-0"	6'-0"	
			Spacing	3"	4½"	7½"
			Length			
			Spacing			
			Length			
			Spacing			
			Length			
			Spacing			
			Length			
			Spacing			

Schedule "A"

Beam No.	Stud Size	No. Of Rows		Zone 1	Zone 2	Zone 3
			Length			
			Spacing			
			Length			
			Spacing			
			Length			
			Spacing			
			Length			
			Spacing			
			Length			
			Spacing			
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			Spacing			
			Length			
			Spacing			
			Length			
			Spacing			
			Length			
			Spacing			

Note:
See Dwg. 12-JK2-8 for explanation of schedule.

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34960
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED
DRAWN S.C.
CHECKED E.L.

12-JK2-17B

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: SCHEDULE FOR SHEAR CONNECTOR | DATE: 9-20-68

REVISIONS

SCHEDULE "B"

For beams not included in tables 12-JK2-20 thru. 31

Beam No.	Stud Size	No. Of Rows	Total No. Of Studs
301	3/4"ϕ x 3"	3	171
302	3/4"ϕ x 3"	3	174
303	3/4"ϕ x 3"	2	54

Beam No.	Stud Size	No. Of Rows	Total No. Of Studs

Note:
1. See notes on 12-JK2-20 for further description of studs.
2. All studs to be spaced uniformly over the length of beam.

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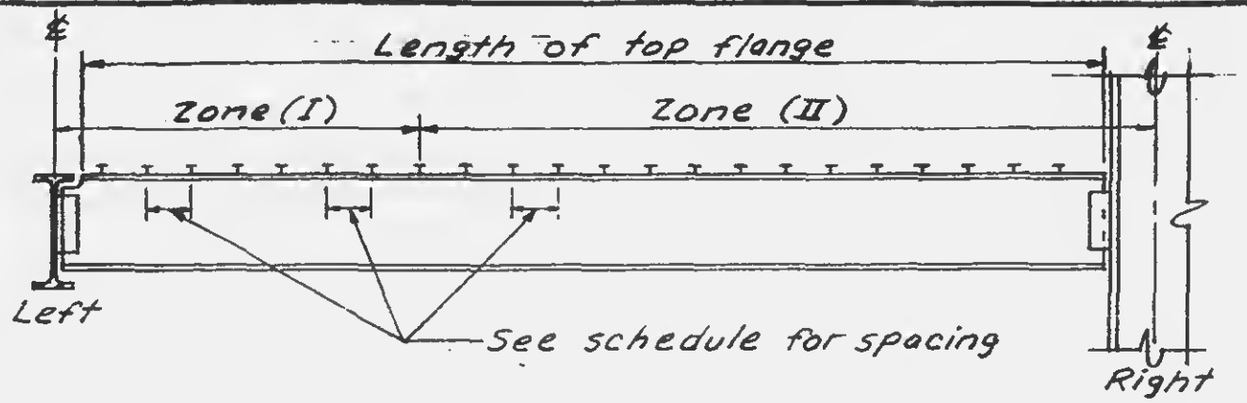
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12-JK2-18

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: SCHEDULE FOR SHEAR CONNECTOR | DATE: 9-20-68

REVISIONS



SCHEDULE "C"

For beams where point of max. moment is not at ℄ of span

Beam No.	Stud Size	ZONE (I) Length	No. Of Rows	Total No. Of Studs	ZONE (II) Length	No. Of Rows	Total No. Of Studs
401	¾ϕx 3"	20'-0"	2	88	10'-0"	3	87
402	¾ϕx 3"	8'-8"	3	90	21'-4"	2	90
403	¾ϕx 3"	9'-0"	3	87	15'-0"	2	88
404	¾ϕx 3"	18'-0"	2	86	12'-0"	3	87
405	¾ϕx 3"	17'-5"	2	76	10'-0"	3	78
406	¾ϕx 3"	15'-0"	2	58	12'-6"	3	57
407	¾ϕx 3"	20'-0"	2	90	10'-0"	3	90
408	¾ϕx 3"	10'-5"	3	90	19'-7"	2	88
409	¾ϕx 3"	10'-5"	3	84	19'-7"	2	84
410	¾ϕx 3"	23'-0"	2	76	7'-0"	3	78
411	¾ϕx 3"	23'-0"	2	84	7'-0"	4	84
412	¾ϕx 3"	20'-0"	2	84	10'-0"	3	84
413	¾ϕx 3"	4'-6"	5	75	25'-6"	2	76
414	¾ϕx 3"	22'-0"	2	86	8'-0"	3	87
415	¾ϕx 3"	12'-6"	3	87	17'-6"	2	86
416	¾ϕx 3"	12'-3"	2	76	7'-9"	3	75
417	¾ϕx 3"	17'-0"	2	68	13'-0"	2	68
418	¾ϕx 3"	9'-3"	3	63	18'-9"	2	64
419	¾ϕx 3"	9'-0"	3	87	22'-6"	2	86
420	¾ϕx 3"	18'-0"	2	86	10'-6"	3	87

Beam No.	Stud Size	ZONE (I) Length	No. Of Rows	Total No. Of Studs	ZONE (II) Length	No. Of Rows	Total No. Of Studs
421	¾"ϕx3"	10'-0"	3	87	20'-0"	2	86
422	¾"ϕx3"	4'-6"	5	85	25'-6"	2	86
423	¾ϕx 3"	10'-0"	3	69	20'-0"	2	68
424	¾ϕx3"	7'-6"	4	88	22'-6"	2	88
425	¾ϕx3"	7'-6"	4	84	22'-6"	2	84
426	¾"ϕx3"	22'-0"	2	76	8'-0"	3	75
427	¾"ϕx3"	12'-6"	4	88	17'-6"	2	88
428	¾"ϕx3"	5'-8"	4	68	24'-4"	2	68
429	¾"ϕx3"	21'-0"	2	84	9'-0"	3	84
430	¾"ϕx3"	11'-0"	4	88	19'-0"	2	88
431	¾"ϕx3"	10'-0"	3	75	20'-0"	2	76
432	¾"ϕx3"	24'-6"	2	86	5'-6"	5	85
433	¾"ϕx3"	17'-0"	2	90	13'-0"	3	90
434	¾"ϕx3"	17'-0"	2	76	13'-0"	3	75
435	¾"ϕx3"	18'-6"	2	86	9'-6"	3	87
436	¾"ϕx3"	21'-0"	2	88	9'-0"	4	88
437	¾"ϕx3"	11'-6"	3	90	18'-6"	2	90
438	¾"ϕx3"	11'-6"	3	75	18'-6"	2	76
439	¾"ϕx3"	15'-0"	2	76	10'-0"	3	78

Note:
See notes on 12-JK2-20 for further description of studs.

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12-JK2-19

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: SCHEDULE FOR SHEAR CONNECTORS | DATE: 4-18-69

REVISIONS

SCHEDULE "C"

Beam No.	Stud size	ZONE (I) Length	ZONE (I) No. of rows	ZONE (I) Total No of studs	ZONE (II) Length	ZONE (II) No. of rows	ZONE (II) Total No of studs
440	$\frac{3}{4}\phi \times 3"$	14'-9"	3	84	21'-3"	3	84
441	$\frac{3}{4}\phi \times 3"$	14'-7"	2	40	17'-5"	2	40
442	$\frac{3}{4}\phi \times 3"$	10'-0"	3	63	20'-0"	3	63
443	$\frac{3}{4}\phi \times 3"$	20'-0"	3	72	14'-0"	3	72
444	$\frac{3}{4}\phi \times 3"$	14'-0"	3	54	21'-0"	3	54
445	$\frac{3}{4}\phi \times 3"$	14'-0"	3	69	22'-0"	3	69
446	$\frac{3}{4}\phi \times 3"$	16'-0"	3	69	20'-0"	3	69
447	$\frac{3}{4}\phi \times 3"$	14'-0"	3	69	19'-0"	3	69
448	$\frac{3}{4}\phi \times 3"$	14'-6"	3	69	18'-6"	3	69
449	$\frac{3}{4}\phi \times 3"$	13'-7"	3	60	19'-5"	3	60
450	$\frac{3}{4}\phi \times 3"$	14'-6"	3	84	21'-6"	3	84
451	$\frac{3}{4}\phi \times 3"$	15'-2"	2	21	11'-10"	2	21
452	$\frac{3}{4}\phi \times 3"$	22'-0"	3	78	11'-0"	3	78
453	$\frac{3}{4}\phi \times 3"$	11'-0"	3	48	9'-0"	3	48

SCHEDULE "C"

Beam No.	Stud size	ZONE (I) Length	ZONE (I) No. of rows	ZONE (I) Total No of studs	ZONE (II) Length	ZONE (II) No. of rows	ZONE (II) Total No of studs

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Note:
See 12-JK2-19 & 12-JK2-20 for further description of studs.

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12-JK2-19A

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: SHEAR STUD CONNECTOR TABLE FORMAT | DATE: 7-19-68

REVISIONS

9-20-68

DESCRIPTION OF SHEAR STUD CONNECTOR TABLES 1, 2 AND 3

BEAM - NOMINAL BEAM SIZE FROM A.I.S.C. LISTING

STUD - NOMINAL STUD SIZE (DIAMETER X LENCTH)

TABLE NO. 1 - THE NUMBER OF SHEAR STUDS CALCULATED USING FORMULA (19) A.I.S.C. FOR THE CONCRETE AND STEEL RANGE SHOWN

TABLE NO. 2 - SAME AS TABLE 1

TABLE NO. 3 - SAME AS TABLE 1

DESCRIPTION OF SHEAR STUD CONNECTOR TABLES 4, 5 AND 6

BEAM SIZE RANGE - NOMINAL BEAM SIZES FOR WHICH ADJACENT TABLES APPLY

STUD - NOMINAL STUD SIZE (DIAMETER X LENCTH)

SLAB T - THICKNESS OF CONCRETE SLAB

TABLE NO. 4 - THE NUMBER OF SHEAR STUDS CALCULATED USINC FORMULA (18) A.I.S.C. FOR THE CONCRETE RANCE SHOWN

TABLE NO. 5 - SAME AS TABLE 4

TABLE NO. 6 - SAME AS TABLE 4

USE OF TABLES

1. REQUIRED: NOMINAL BEAM SIZE AND YIELD STRENGTH OF THE STEEL BEAM; COMPRESSIVE STRENGTH AND THICKNESS OF THE CONCRETE SLAB.
2. A STUD COUNT CAN BE SELECTED FROM TABLES 1, 2 OR 3 USING ONLY THE FIRST THREE OF THE ABOVE REQUIREMENTS.
3. A STUD COUNT SELECTION IS MADE ALSO FROM TABLES 4, 5 OR 6 USING THE ABOVE REQUIREMENTS EXCEPT FOR YIELD STRENGTH OF THE STEEL BEAM. WHERE SLAB THICKNESSES EXCEED THE SCOPE OF THESE TABLES, USE THE STUD COUNT FOR THE LARGEST TABULATED SLAB THICKNESS.
4. TWICE THE SMALLER OF THE TWO VALUES OBTAINED IN STEPS 2 AND 3 IS THE TOTAL NUMBER OF STUDS REQUIRED.

NOTES:

1. WHERE A SYMBOL ( ) IS SHOWN ON PLANS, SEE STUD SCHEDULE ON 12-JK2-8.
   FOR 300 SERIES, SEE SCHEDULE B ON 12-JK2-18.
   FOR 400 SERIES, SEE SCHEDULE C ON 12-JK2-19.
2. STUD SPACINCS: LONGITUDINAL - 2'-0" MAX. 3" MIN.
   TRANSVERSE - I-7/8" MIN.
   DISTANCE FROM EDGE OF FLANGES - I" MIN.
3. SHEAR CONNECTORS FOR BEAMS AT EL. 264, SEE 12-JK2-5.

LICENSED PROFESSIONAL ENGINEER

DESIGNED

DRAWN

REVIEWED

12-JK2- 20

SKILLING HELLE CHRISTIANSEN ROBERTSON — Civil & Structural Engineers

REVISIONS

PROJECT THE WORLD TRADE CENTER | STUD SHEAR CONNECTOR TABLES | DATE 7/19/68

BEAM	STUD	TABLE NO. 1 STONE F'C=3000 FY=36	TABLE NO. 1 STONE F'C=3000 FY=42	TABLE NO. 2 STONE F'C=4000 FY=36	TABLE NO. 2 STONE F'C=4000 FY=42	TABLE NO. 2 STONE F'C=4000 FY=50	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=36	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=42	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=45	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=50	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=60
36 WF 300	3/4 X 3	138	161	120	140	166	163	190	203	226	271
36 WF 280	3/4 X 3	129	151	112	130	155	152	177	190	211	253
36 WF 260	3/4 X 3	120	140	104	121	144	141	165	177	196	235
36 WF 245	3/4 X 3	113	132	98	114	136	133	155	166	185	222
36 WF 230	3/4 X 3	107	124	92	107	128	125	146	156	174	208
36 WF 194	3/4 X 3	90	105	78	91	108	106	123	132	147	176
36 WF 182	3/4 X 3	84	98	73	85	101	99	116	124	137	165
36 WF 170	3/4 X 3	79	92	68	79	94	93	108	116	128	154
36 WF 160	3/4 X 3	74	86	64	75	89	87	102	109	121	145
36 WF 150	3/4 X 3	70	81	60	70	83	82	95	102	113	136
36 WF 135	3/4 X 3	63	73	54	63	75	74	86	92	102	122
33 WF 240	3/4 X 3	111	129	96	112	133	130	152	163	181	217
33 WF 220	3/4 X 3	102	119	88	103	122	120	140	149	166	199
33 WF 200	3/4 X 3	93	108	80	93	111	109	127	136	151	181
33 WF 152	3/4 X 3	70	82	61	71	85	83	97	103	115	138
33 WF 141	3/4 X 3	65	76	57	66	79	77	90	96	107	128
33 WF 130	3/4 X 3	60	70	52	61	72	71	83	89	98	118
33 WF 118	3/4 X 3	55	64	47	55	66	64	75	80	89	107
30 WF 210	3/4 X 3	97	113	84	98	117	114	133	143	158	190
30 WF 190	3/4 X 3	88	103	76	89	106	103	121	129	143	172
30 WF 172	3/4 X 3	80	93	69	80	96	94	109	117	130	156
30 WF 132	3/4 X 3	61	71	53	62	73	72	84	90	100	120
30 WF 124	3/4 X 3	58	67	50	58	69	68	79	84	94	112
30 WF 116	3/4 X 3	54	63	47	54	65	63	74	79	88	105
30 WF 108	3/4 X 3	50	59	43	51	60	59	69	74	82	98
30 WF 99	3/4 X 3	46	54	40	46	55	54	63	67	75	90
27 WF 177	3/4 X 3	82	96	71	83	98	96	112	120	134	160
27 WF 160	3/4 X 3	74	86	64	75	89	87	102	109	121	145
27 WF 145	3/4 X 3	67	78	58	68	81	79	92	99	110	131
27 WF 114	3/4 X 3	53	62	46	53	64	62	73	78	86	103
27 WF 102	3/4 X 3	47	55	41	48	57	56	65	70	77	93
27 WF 94	3/4 X 3	44	51	38	44	52	51	60	64	71	85
27 WF 84	3/4 X 3	39	46	34	40	47	46	54	57	64	76

LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

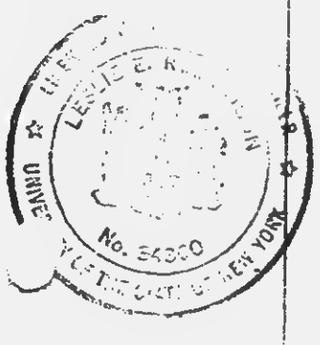
12-JK2- 21

SKILLING HELLE CHRISTIANSEN ROBERTSON

PROJECT: THE WORLD TRADE CENTER | TITLE: STUD SHEAR CONNECTOR TABLES | DATE: 7/19/68

REVISIONS

BEAM	STUD	TABLE NO. 1 STONE F'C=3000 FY=36	TABLE NO. 1 STONE F'C=3000 FY=42	TABLE NO. 2 STONE F'C=4000 FY=36	TABLE NO. 2 STONE F'C=4000 FY=42	TABLE NO. 2 STONE F'C=4000 FY=50	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=36	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=42	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=45	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=50	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=60
24 WF 160	3/4 X 3	74	86	64	75	89	87	102	109	121	145
24 WF 145	3/4 X 3	67	78	58	68	81	79	92	99	109	131
24 WF 130	3/4 X 3	60	70	52	61	72	71	83	88	98	118
24 WF 120	3/4 X 3	56	65	48	56	67	65	76	82	91	109
24 WF 110	3/4 X 3	51	60	44	52	61	60	70	75	83	100
24 WF 100	3/4 X 3	47	54	40	47	56	55	64	68	76	91
24 WF 94	3/4 X 3	44	51	38	44	52	51	60	64	71	85
24 WF 84	3/4 X 3	39	46	34	40	47	46	54	57	64	76
24 WF 76	3/4 X 3	36	41	31	36	43	42	49	52	58	69
24 WF 68	3/4 X 3	32	37	28	32	38	37	43	47	52	62
21 WF 142	3/4 X 3	66	77	57	66	79	77	90	97	107	129
21 WF 127	3/4 X 3	59	69	51	59	71	69	81	86	96	115
21 WF 112	3/4 X 3	52	61	45	52	62	61	71	76	85	102
21 WF 96	3/4 X 3	45	52	39	45	54	52	61	65	73	87
21 WF 82	3/4 X 3	38	44	33	39	46	45	52	56	62	74
21 WF 73	3/4 X 3	34	40	30	34	41	40	47	50	55	66
21 WF 68	3/4 X 3	32	37	28	32	38	37	43	47	52	62
21 WF 62	3/4 X 3	29	34	25	29	35	34	40	42	47	56
21 WF 55	3/4 X 3	26	30	22	26	31	30	35	38	42	50
18 WF 114	3/4 X 3	53	62	46	53	63	62	72	78	86	103
18 WF 105	3/4 X 3	49	57	42	49	58	57	67	72	79	95
18 WF 96	3/4 X 3	45	52	39	45	54	52	61	65	73	87
18 WF 85	3/4 X 3	40	46	34	40	47	46	54	58	64	77
18 WF 77	3/4 X 3	36	42	31	36	43	42	49	53	58	70
18 WF 70	3/4 X 3	33	38	28	33	39	38	45	48	53	64
18 WF 64	3/4 X 3	30	35	26	30	36	35	41	44	49	58
18 WF 60	3/4 X 3	28	33	24	28	34	33	38	41	46	55
18 WF 55	3/4 X 3	26	30	22	26	31	30	35	38	42	50
18 WF 50	3/4 X 3	24	27	20	24	28	28	32	34	38	46
18 WF 45	3/4 X 3	21	25	18	21	25	25	29	31	34	41

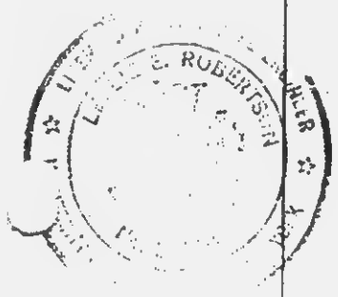


SKILLING HELLE CHRISTIANSEN ROBERTSON — Civil & Structural Engineers

PROJECT THE WORLD TRADE CENTER | TITLE STUD SHEAR CONNECTOR TABLES | DATE 7/19/68

REVISIONS

BEAM	STUD	TABLE NO. 1 STONE F'C=3000 FY=36	TABLE NO. 1 STONE F'C=3000 FY=42	TABLE NO. 2 STONE F'C=4000 FY=36	TABLE NO. 2 STONE F'C=4000 FY=42	TABLE NO. 2 STONE F'C=4000 FY=50	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=36	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=42	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=45	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=50	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=60
16 WF 96	3/4 X 3	45	52	39	45	54	52	61	65	73	87
16 WF 88	3/4 X 3	41	48	36	41	49	48	56	60	67	80
16 WF 78	3/4 X 3	36	42	32	37	44	43	50	53	59	71
16 WF 71	3/4 X 3	33	39	29	33	40	39	45	49	54	65
16 WF 64	3/4 X 3	30	35	26	30	36	35	41	44	49	58
16 WF 58	3/4 X 3	27	32	24	27	33	32	37	40	44	53
16 WF 50	3/4 X 3	23	27	20	24	28	28	32	34	38	46
16 WF 45	3/4 X 3	21	25	18	21	25	25	29	31	34	41
16 WF 40	3/4 X 3	19	22	16	19	23	22	26	28	31	37
16 WF 36	3/4 X 3	17	20	15	17	20	20	23	25	28	33
14 WF 136	3/4 X 3	63	73	55	64	76	74	86	93	103	123
14 WF 127	3/4 X 3	59	69	51	59	71	69	81	86	96	115
14 WF 119	3/4 X 3	55	64	48	56	66	65	76	81	90	108
14 WF 111	3/4 X 3	52	60	45	52	62	61	71	76	84	101
14 WF 103	3/4 X 3	48	56	41	48	57	56	65	70	78	93
14 WF 95	3/4 X 3	44	52	38	45	53	52	61	65	72	86
14 WF 87	3/4 X 3	40	47	35	41	49	48	55	59	66	79
14 WF 84	3/4 X 3	39	46	34	40	47	46	54	57	64	76
14 WF 78	3/4 X 3	36	42	32	37	44	43	50	53	59	71
14 WF 74	3/4 X 3	35	40	30	35	41	41	47	51	56	67
14 WF 68	3/4 X 3	32	37	28	32	38	37	43	47	52	62
14 WF 61	3/4 X 3	29	33	25	29	34	34	39	42	46	56
14 WF 53	3/4 X 3	25	29	22	25	30	29	34	36	40	48
14 WF 48	3/4 X 3	23	26	20	23	27	26	31	33	37	44
14 WF 43	3/4 X 3	20	24	18	20	24	24	28	30	33	39
14 WF 38	3/4 X 3	18	21	16	18	21	21	24	26	29	35
14 WF 34	3/4 X 3	16	19	14	16	19	19	22	24	26	31
14 WF 30	3/4 X 3	14	17	12	14	17	17	19	21	23	28



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SKILLING HELLE CHRISTIANSEN ROBERTSON — CIVIL STRUCTURAL CONSULTANTS

PROJECT: THE WORLD TRADE CENTER | TITLE: STUD SHEAR CONNECTOR TABLES | DATE: 7/19/68

REVISIONS

BEAM	STUD	TABLE NO. 1 STONE F'C=3000 FY=36	TABLE NO. 1 STONE F'C=3000 FY=42	TABLE NO. 2 STONE F'C=4000 FY=36	TABLE NO. 2 STONE F'C=4000 FY=42	TABLE NO. 2 STONE F'C=4000 FY=50	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=36	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=42	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=45	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=50	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=60
12 WF 99	3/4 X 3	46	54	40	46	55	54	63	67	75	90
12 WF 92	3/4 X 3	43	50	37	43	51	50	59	63	70	84
12 WF 85	3/4 X 3	40	46	34	40	47	46	54	58	64	77
12 WF 79	3/4 X 3	37	43	32	37	44	43	50	54	60	72
12 WF 72	3/4 X 3	34	39	29	34	40	39	46	49	55	65
12 WF 65	3/4 X 3	30	35	26	31	36	36	42	44	49	59
12 WF 58	3/4 X 3	27	32	24	27	33	32	37	40	44	53
12 WF 53	3/4 X 3	25	29	22	25	30	29	34	36	40	48
12 WF 50	3/4 X 3	24	27	20	24	28	28	32	34	38	46
12 WF 45	3/4 X 3	21	25	18	21	25	25	29	31	34	41
12 WF 40	3/4 X 3	19	22	16	19	23	22	26	28	31	37
12 WF 36	3/4 X 3	17	20	15	17	20	20	23	25	28	33
12 WF 31	3/4 X 3	15	17	13	15	18	17	20	21	24	28
12 WF 27	3/4 X 3	13	15	11	13	15	15	18	19	21	25
10 WF 112	3/4 X 3	52	61	45	52	62	61	71	76	85	102
10 WF 100	3/4 X 3	47	54	40	47	56	55	64	68	76	91
10 WF 89	3/4 X 3	41	48	36	42	50	49	57	61	67	81
10 WF 77	3/4 X 3	36	42	31	36	43	42	49	53	58	70
10 WF 72	3/4 X 3	34	39	29	34	40	39	46	49	55	65
10 WF 66	3/4 X 3	31	36	27	31	37	36	42	45	50	60
10 WF 60	3/4 X 3	28	33	24	28	34	33	38	41	46	55
10 WF 54	3/4 X 3	25	29	22	26	30	30	35	37	41	49
10 WF 49	3/4 X 3	23	27	20	23	28	27	31	34	37	45
10 WF 45	3/4 X 3	21	25	18	21	25	25	29	31	34	41
10 WF 39	3/4 X 3	18	21	16	19	22	22	25	27	30	36
10 WF 33	3/4 X 3	16	18	14	16	19	18	21	23	25	30
10 WF 29	3/4 X 3	14	16	12	14	17	16	19	20	22	27
10 WF 25	3/4 X 3	12	14	10	12	14	14	16	17	19	23
10 WF 21	3/4 X 3	10	12	9	10	12	12	14	15	16	19
8 WF 67	3/4 X 3	31	36	27	32	38	37	43	46	51	61
8 WF 58	3/4 X 3	27	32	24	27	33	32	37	40	44	53
8 WF 48	3/4 X 3	23	26	20	23	27	26	31	33	37	44
8 WF 40	3/4 X 3	19	22	16	19	23	22	26	28	31	37
8 WF 35	3/4 X 3	17	19	14	17	20	19	23	24	27	32
8 WF 31	3/4 X 3	15	17	13	15	18	17	20	21	24	28
8 WF 28	3/4 X 3	13	16	12	13	16	16	18	19	22	26
8 WF 24	3/4 X 3	12	13	10	12	14	13	16	17	19	22
8 WF 20	3/4 X 3	10	11	8	10	12	11	13	14	16	19
8 WF 17	3/4 X 3	8	10	7	8	10	10	11	12	13	16



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SKILLING HELLE CHRISTIANSEN ROBERTSON — CIVIL & STRUCTURAL ENGINEERS

PROJECT THE WORLD TRADE CENTER | TITLE STUD SHEAR CONNECTOR TABLES | DATE 7/19/68

REVISIONS

BEAM	STUD	TABLE NO. 1 STONE F'C=3000 FY=36	TABLE NO. 1 STONE F'C=3000 FY=42	TABLE NO. 2 STONE F'C=4000 FY=36	TABLE NO. 2 STONE F'C=4000 FY=42	TABLE NO. 2 STONE F'C=4000 FY=50	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=36	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=42	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=45	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=50	TABLE NO. 3 LIGHT WEIGHT F'C=3000 FY=60
24 B 61.0	3/4 X 3	29	33	25	29	34	34	39	42	46	56
24 B 55.0	3/4 X 3	26	30	22	26	31	30	35	38	42	50
21 B 49.0	3/4 X 3	23	27	20	23	28	27	31	34	37	45
21 B 44.0	3/4 X 3	21	24	18	21	25	24	28	30	34	40
18 B 40.0	3/4 X 3	19	22	16	19	23	22	26	28	31	37
18 B 35.0	3/4 X 3	17	19	14	17	20	19	23	24	27	32
16 B 31.0	3/4 X 3	15	17	13	15	18	17	20	21	24	28
16 B 26.0	3/4 X 3	12	14	11	13	15	15	17	18	20	24
14 B 26.0	3/4 X 3	12	14	11	13	15	15	17	18	20	24
14 B 22.0	3/4 X 3	11	12	9	11	13	12	14	15	17	20
14 B 17.2	3/4 X 3	8	10	7	8	10	10	11	12	13	16
12 B 22.0	3/4 X 3	11	12	9	11	13	12	14	15	17	20
12 B 19.0	3/4 X 3	9	11	8	9	11	11	13	13	15	18
12 B 16.5	3/4 X 3	8	9	7	8	10	9	11	12	13	15
12 B 14.0	3/4 X 3	7	8	6	7	8	8	9	10	11	13
10 B 19.0	3/4 X 3	9	11	8	9	11	11	13	13	15	18
10 B 17.0	3/4 X 3	8	10	7	8	10	10	11	12	13	16
10 B 15.0	3/4 X 3	7	9	6	7	9	9	10	11	12	14
10 B 11.5	5/8 X 2-1/2	8	9	7	8	10	9	11	12	13	15
8 B 15.0	3/4 X 3	7	9	6	7	9	9	10	11	12	14
8 B 13.0	3/4 X 3	6	7	6	7	8	8	9	9	10	12
8 B 10.0	5/8 X 2-1/2	7	8	6	7	9	8	10	10	11	14
6 B 16.0	3/4 X 3	8	9	7	8	9	9	11	11	13	15
6 B 12.0	3/4 X 3	6	7	5	6	7	7	8	9	10	11
6 B 8.5	5/8 X 2-1/2	6	7	5	6	7	7	8	9	10	12

LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON UNIVERSITY OF T...

12-JK2-

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Civil & Structural Engineers

REVISIONS

PROJECT: THE WORLD TRADE CENTER

TITLE: STUD SHEAR CONNECTOR TABLES

DATE: 7/19/68

BEAM SIZE RANGE	STUD	SLAB T(IN.)	TABLE NO. 4 STONE F'C=3000	TABLE NO. 5 STONE F'C=4000	TABLE NO. 6 LIGHT WEIGHT F'C=3000
36WF300 - 36WF230	3/4 X 3	4.50	45	51	52
		5.00	54	62	63
		5.50	64	74	75
		6.00	75	87	89
		7.00	100	115	118
		8.00	129	148	151
		11.00	230	266	271
36WF194 - 36WF135	3/4 X 3	4.50	42	49	50
		5.00	51	59	60
		5.50	61	71	72
		6.00	72	83	85
		7.00	97	111	114
		8.00	125	144	147
		9.00	149	172	176
33WF240 - 33WF200	3/4 X 3	4.50	44	51	52
		5.00	54	62	63
		5.50	64	73	75
		6.00	75	86	88
		7.00	100	115	117
		8.00	128	147	150
		9.75	184	213	217
33WF152 - 33WF118	3/4 X 3	4.50	42	49	50
		5.00	51	59	60
		5.50	61	70	72
		6.00	72	83	85
		7.00	96	111	113
		7.75	117	135	138

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — UNIVERSITY OF [illegible]

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SKILLING HELLE CHRISTIANSEN ROBERTSON — Civil & Structural Engineers

PROJECT: THE WORLD TRADE CENTER

TITLE: STUD SHEAR CONNECTOR TABLES

DATE: 7/19/68

REVISIONS

BEAM SIZE RANGE	STUD	SLAB T(IN.)	TABLE NO. 4 STONE F'C=3000	TABLE NO. 5 STONE F'C=4000	TABLE NO. 6 LIGHT WEIGHT F'C=3000
30WF210 - 30WF172	3/4 X 3	4.50	44	51	52
		5.00	53	61	62
		5.50	63	73	74
		6.00	74	86	87
		7.00	99	114	116
		8.00	127	147	150
		9.25	162	186	190
30WF132 - 30WF 99	3/4 X 3	4.50	42	48	49
		5.00	51	58	60
		5.50	61	70	71
		6.00	71	82	84
		7.00	96	110	112
		7.25	102	117	120
27WF177 - 27WF145	3/4 X 3	4.50	43	50	51
		5.00	53	61	62
		5.50	63	72	74
		6.00	74	85	87
		7.00	98	113	116
		8.00	126	146	149
		8.50	136	157	160
27WF114 - 27WF 84	3/4 X 3	4.50	41	48	49
		5.00	50	58	59
		5.50	60	69	71
		6.00	71	82	83
		6.75	88	101	103
24WF160 - 24WF130	3/4 X 3	4.50	43	50	51
		5.00	53	61	62
		5.50	63	72	74
		6.00	74	85	87
		7.00	98	113	116
		8.00	123	142	145
24WF120 - 24WF100	3/4 X 3	4.50	42	49	50
		5.00	51	59	60
		5.50	61	71	72
		6.00	72	83	85
		7.00	93	107	109
24WF 94 - 24WF 68	3/4 X 3	4.50	41	47	48
		5.00	50	57	59
		5.50	60	69	70
		6.00	70	81	83
		6.25	73	84	85

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12-JK2- 27

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Civil & Structural Engineers

REVISIONS

PROJECT THE WORLD TRADE CENTER

TITLE STUD SHEAR CONNECTOR TABLES

DATE 7/19/68

BEAM SIZE RANGE	STUD	SLAB T(IN.)	TABLE NO. 4 STONE F'C=3000	TABLE NO. 5 STONE F'C=4000	TABLE NO. 6 LIGHT WEIGHT F'C=3000
21WF142 - 21WF112	3/4 X 3	4.50	43	49	50
		5.00	52	60	61
		5.50	62	71	73
		6.00	73	84	86
		7.00	98	112	115
		7.50	109	126	129
21WF 96 - 21WF 82	3/4 X 3	4.50	41	47	48
		5.00	50	57	59
		5.50	60	69	70
		6.00	70	81	83
		6.25	74	85	87
21WF 73 - 21WF 55	3/4 X 3	4.50	41	47	48
		5.00	49	57	58
		5.50	56	65	66
18WF114 - 18WF 96	3/4 X 3	4.50	42	49	50
		5.00	51	59	60
		5.50	61	71	72
		6.00	72	83	85
		6.75	88	101	103
18WF 85 - 18WF 64	3/4 X 3	4.50	41	47	48
		5.00	50	57	58
		5.50	59	69	70
		6.00	66	76	77
18WF 60 - 18WF 45	3/4 X 3	4.50	40	46	47
		5.00	47	54	55

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12-JK2- 28

SKILLING HELLE CHRISTIANSEN ROBERTSON — CIVIL & STRUCTURAL ENGINEERS

PROJECT THE WORLD TRADE CENTER

TITLE STUD SHEAR CONNECTOR TABLES

DATE 7/19/68

REVISIONS

BEAM SIZE RANGE	STUD	SLAB T(IN.)	TABLE NO. 4 STONE F'C=3000	TABLE NO. 5 STONE F'C=4000	TABLE NO. 6 LIGHT WEIGHT F'C=3000
16WF 96 - 16WF 88	3/4 X 3	4.50	42	49	50
		5.00	51	59	60
		5.50	61	70	72
		6.00	72	83	85
		6.25	74	85	87
16WF 78 - 16WF 58	3/4 X 3	4.50	41	47	48
		5.00	50	57	58
		5.50	59	68	70
		5.75	60	69	71
16WF 50 - 16WF 36	3/4 X 3	4.50	39	45	46
14WF136 - 14WF 87	3/4 X 3	4.50	44	50	51
		5.00	53	61	62
		5.50	63	73	74
		6.00	74	85	87
		7.00	99	114	116
		7.25	105	121	123
14WF 84 - 14WF 78	3/4 X 3	4.50	42	49	50
		5.00	51	59	60
		5.50	61	71	72
		5.75	65	75	76
14WF 74 - 14WF 61	3/4 X 3	4.50	41	48	49
		5.00	50	58	59
		5.50	57	66	67
14WF 53 - 14WF 43	3/4 X 3	4.50	40	47	47
		4.75	41	47	48
14WF 38 - 14WF 30	3/4 X 3	4.50	30	34	35

LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON No. 34360 UNIVERSITY OF THE STATE OF NEW YORK

12-JK2- 29

PROJECT: THE WORLD TRADE CENTER | TITLE: STUD SHEAR CONNECTOR TABLES | DATE: 7/19/68

REVISIONS

BEAM SIZE RANGE	STUD	SLAB T(IN.)	TABLE NO. 4 STONE F'C=3000	TABLE NO. 5 STONE F'C=4000	TABLE NO. 6 LIGHT WEIGHT F'C=3000
12WF 99 - 12WF 65	3/4 X 3	4.50	42	49	50
		5.00	51	59	60
		5.50	61	71	72
		6.00	72	83	85
		6.25	76	88	90
12WF 58 - 12WF 53	3/4 X 3	4.50	41	48	49
		4.75	45	52	53
12WF 50 - 12WF 40	3/4 X 3	4.50	39	45	46
12WF 36 - 12WF 27	3/4 X 3	4.50	28	32	33
10WF112 - 10WF 49	3/4 X 3	4.50	41	48	49
		5.00	50	58	59
		5.50	60	69	71
		6.00	71	82	83
		6.75	86	99	102
10WF 45 - 10WF 33	3/4 X 3	4.50	35	40	41
10WF 29 - 10WF 21	3/4 X 3	4.50	23	26	27
8WF 67 - 8WF 31	3/4 X 3	4.50	40	47	47
		5.00	49	57	58
		5.25	52	60	61
8WF 28 - 8WF 24	3/4 X 3	4.50	22	25	26
8WF 20 - 8WF 17	3/4 X 3	4.50	16	18	19

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — STATE OF NEW YORK

SKILLING HELLE CHRISTIANSEN ROBERTSON — Civil & Structural Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: STUD SHEAR CONNECTOR TABLES | DATE: 7/19/68

REVISIONS

BEAM SIZE RANGE	STUD	SLAB T(IN.)	TABLE NO. 4 STONE F'C=3000	TABLE NO. 5 STONE F'C=4000	TABLE NO. 6 LIGHT WEIGHT F'C=3000
24 B 61 - 24 B 55	3/4 X 3	4.50	40	46	47
		5.00	47	54	56
21 B 49 - 21 B 44	3/4 X 3	4.50	38	44	45
18 B 40 - 18 B 35	3/4 X 3	4.50	31	36	37
16 B 31 - 16 B 26	3/4 X 3	4.50	24	28	28
14 B 26 - 14 B 22	3/4 X 3	4.50	20	23	24
14 B 17 - 14 B 17	3/4 X 3	4.50	14	16	16
12 B 22 - 12 B 14	3/4 X 3	4.50	17	20	20
10 B 19 - 10 B 15	3/4 X 3	4.50	15	17	18
10 B 11.5	5/8 X 2-1/2	4.50	12	15	15
8 B 15 - 8 B 13	3/4 X 3	4.50	12	14	14
8 B 10	5/8 X 2-1/2	4.50	12	13	14
6 B 16 - 6 B 12	3/4 X 3	4.50	13	15	15
6 B 8.5	5/8 X 2-1/2	4.50	10	11	12

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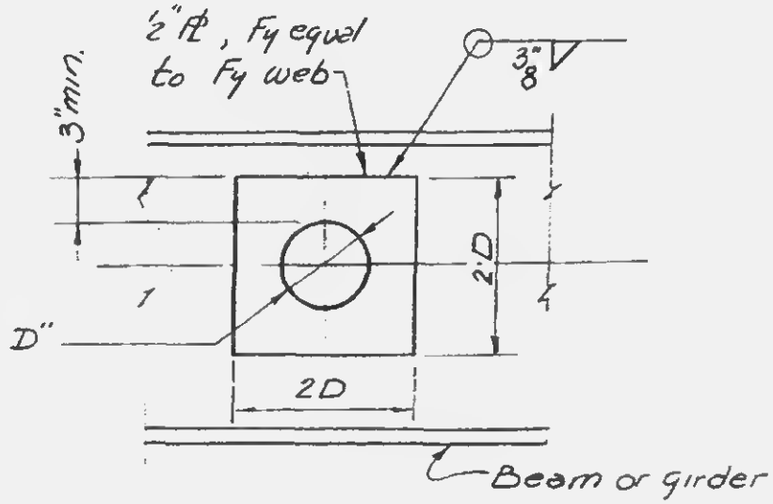
12-JK2- 31

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE BEAM AND GIRDER DTLS. - SPRINKLER PIPE HOLES | DATE 6-7-68

REVISIONS

SCHEDULE - HOLES IN WEBS OF BEAMS & GIRDERS			
MARK	DIAMETER	ELEV. OF ℄ HOLE	REINFORCEMENT REQUIRED
S-1	5"	288'-1"	none
S-2	10"	288'-0"	Detail a
S-3	5"	288'-0"	none
S-4	9"	287'-6"	none
S-5	9"	288'-6"	none
S-6	10"	288'-5"	Detail a
S-7	8"	288'-2"	none



Detail a

For locations of holes, see Plans.

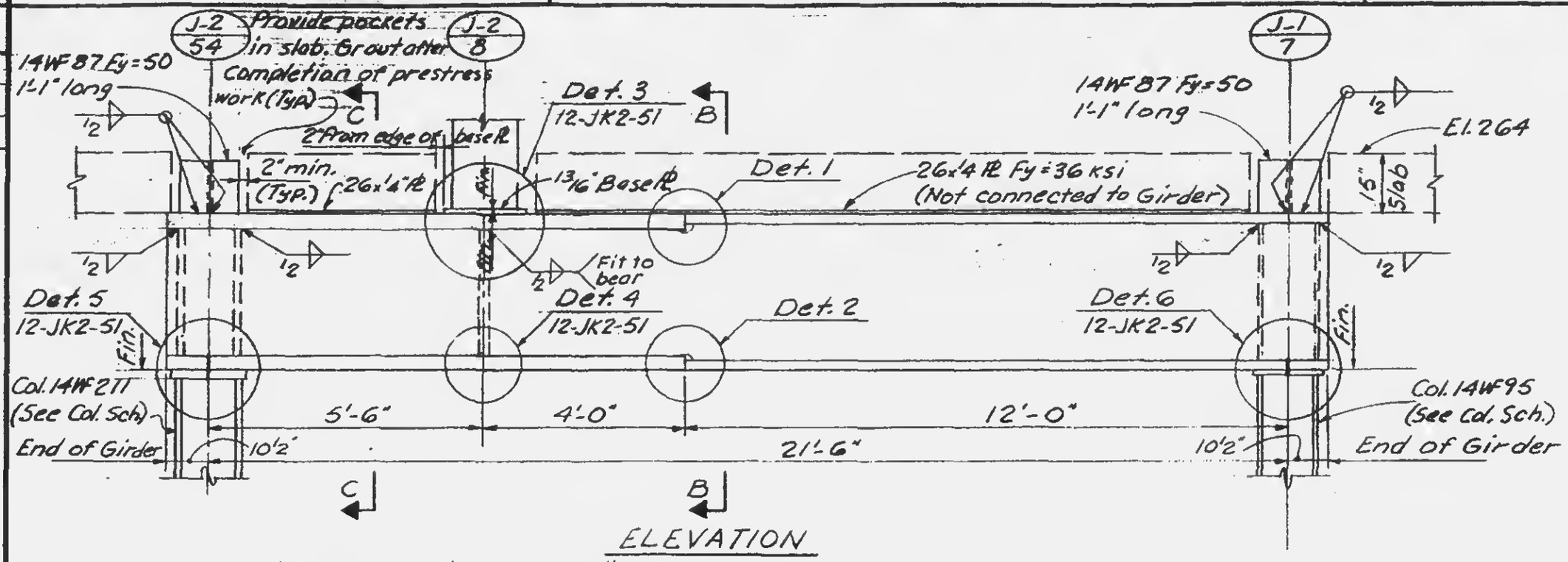
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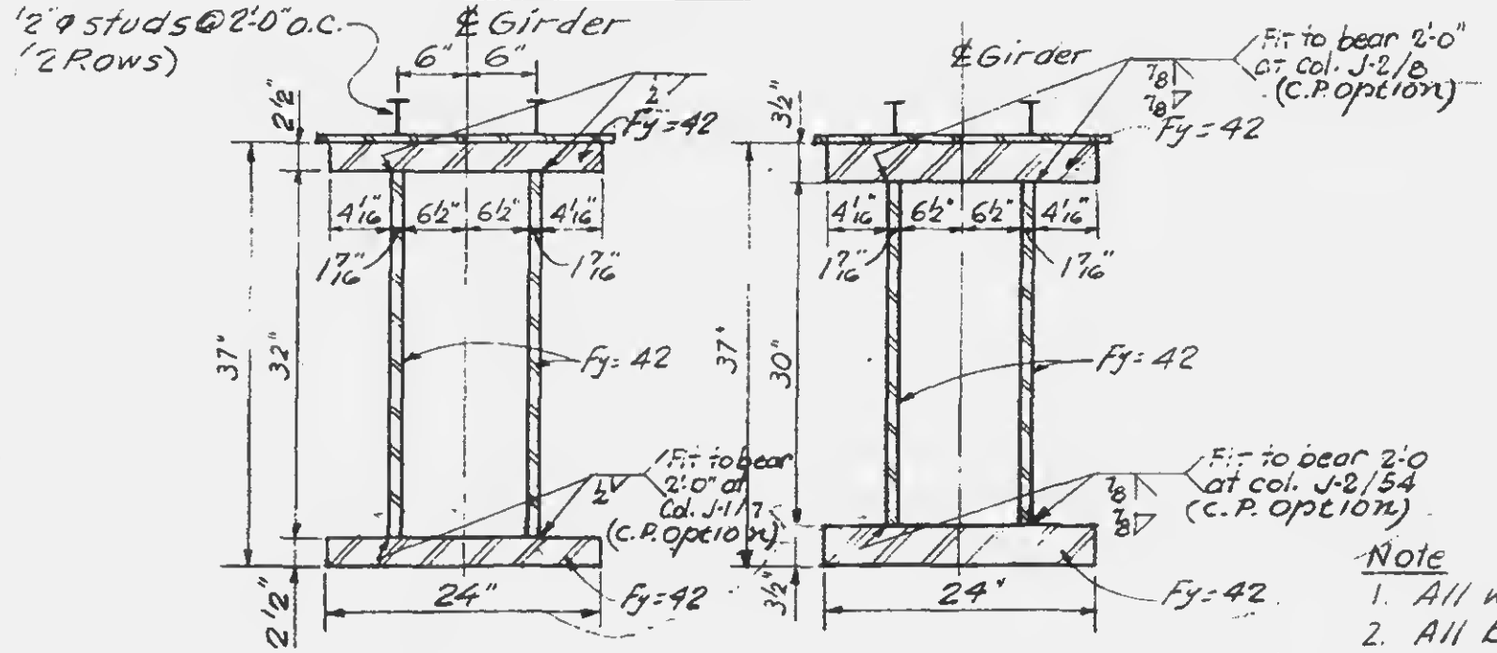
12-JK2-49

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 2-29-68

REVISIONS
4-5-68
6-28-68
1-3-69





Note
1. All welds to be E70xx
2. All bolts to be A-325 friction type.
3. Col. cap Pl Detail Similar to Detail 104 (10-JK2-7.)

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REVIEWED E.L.

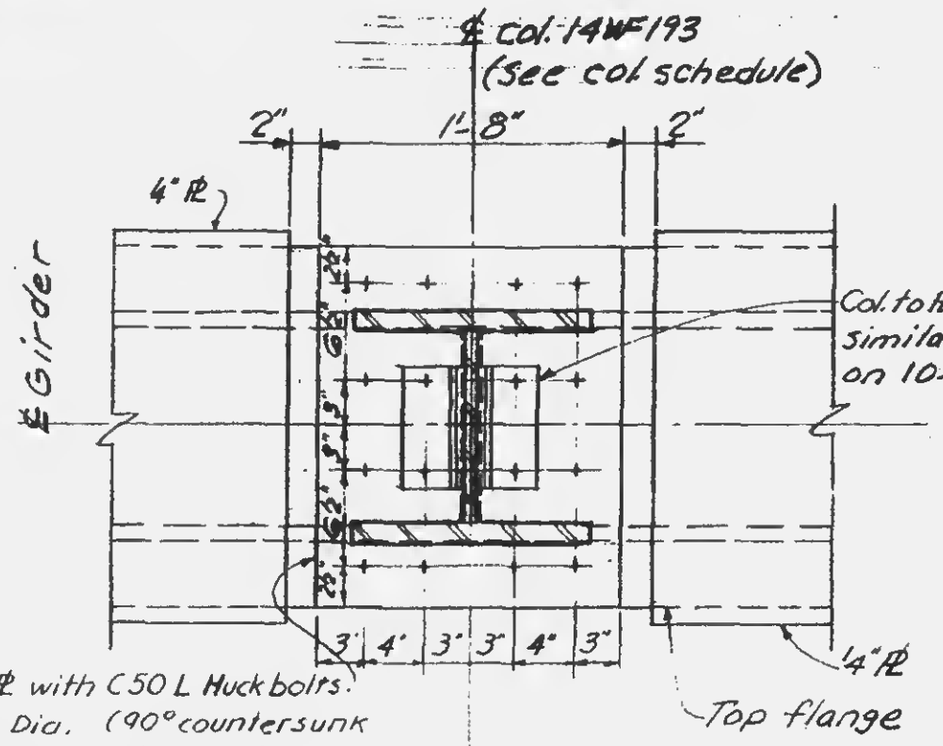
12-JK2-50

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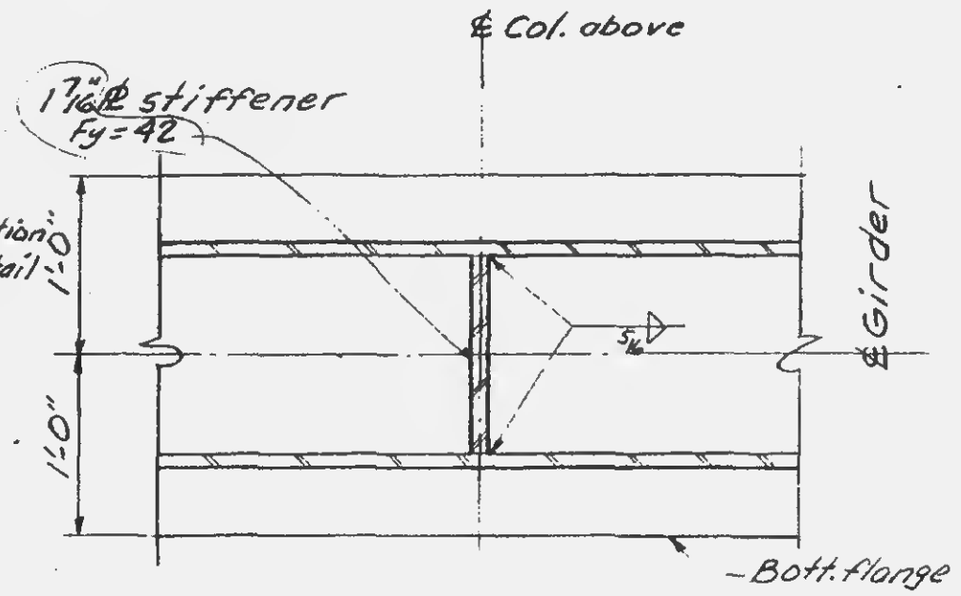
PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 2-29-68

REVISIONS

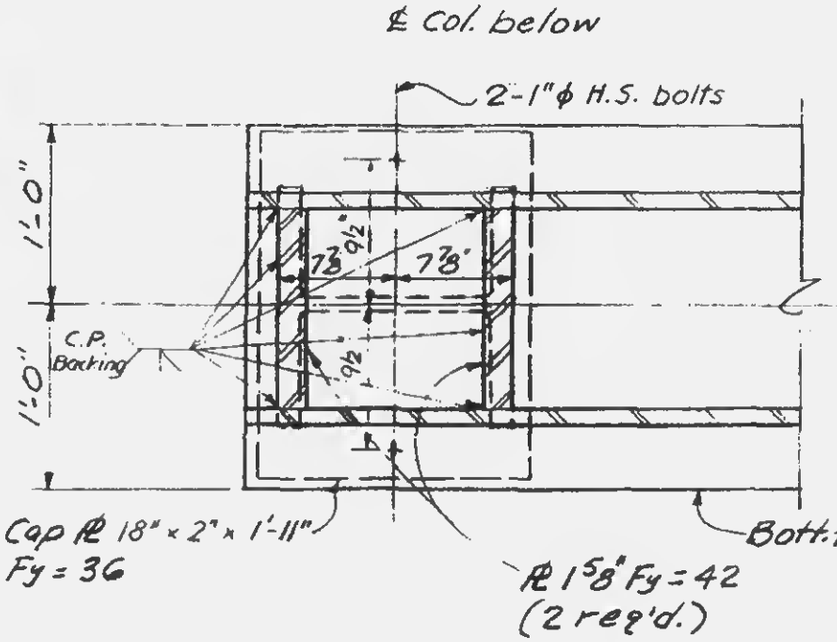
7-19-68



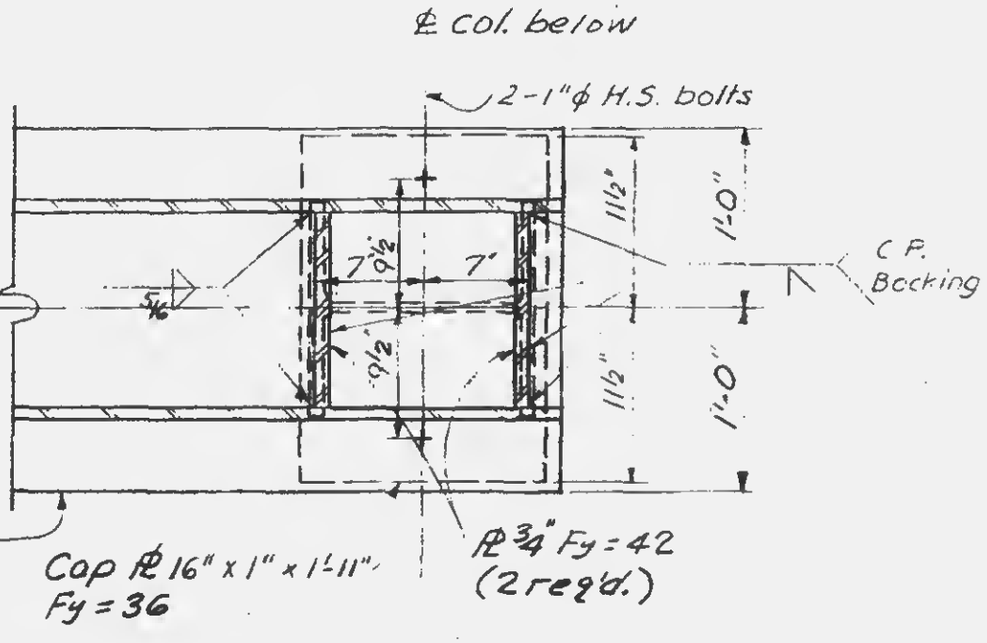
Detail 3



Detail 4



Detail 5



Detail 6

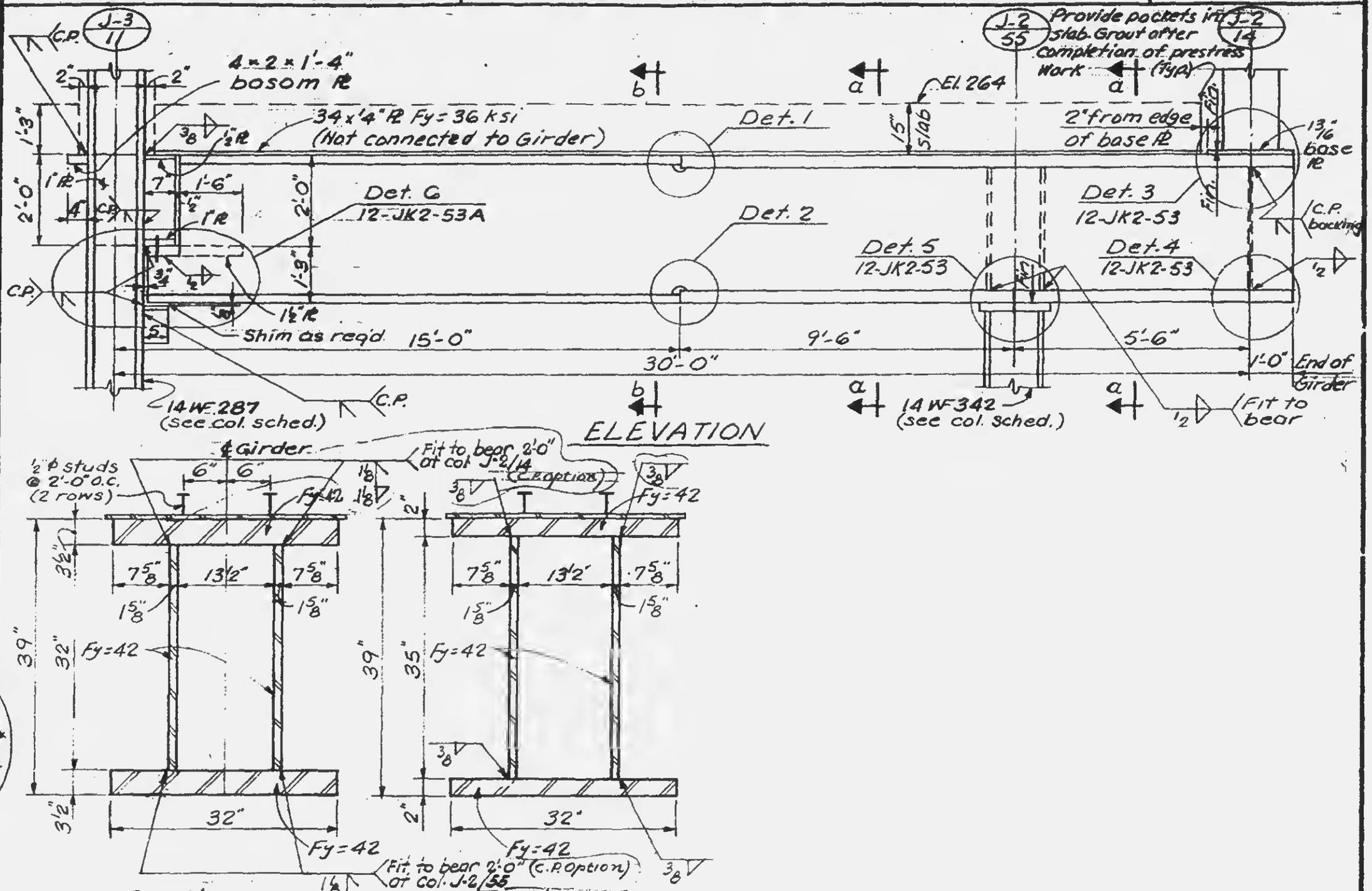
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12-JK2-51

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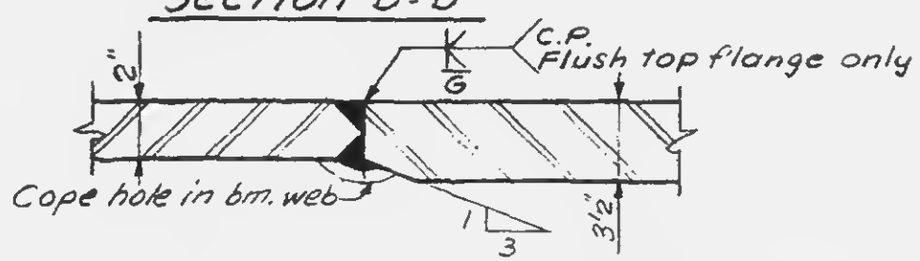
PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 2-29-68

REVISIONS
4-5-68
6-28-68
1-3-69



Section a-a

Section b-b



Detail 1 (As shown) Detail 2 (Reflected)

Notes:
1. All welds to be E70xx.
2. All bolts to be A-325 friction type.
3. Col. cap PL Detail similar to Detail 104 (10-JK2-7).

12-JK2-52

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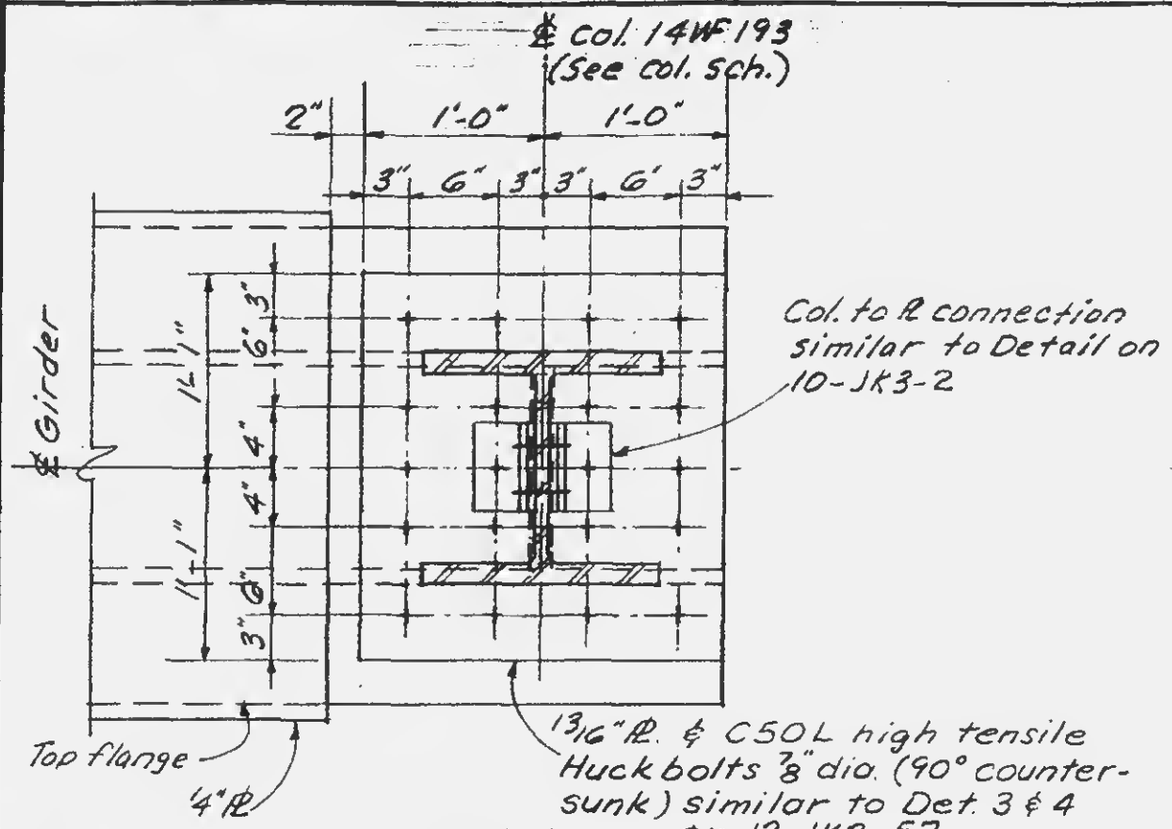
DRAWN S.T.M.
REVIEWED E.L.

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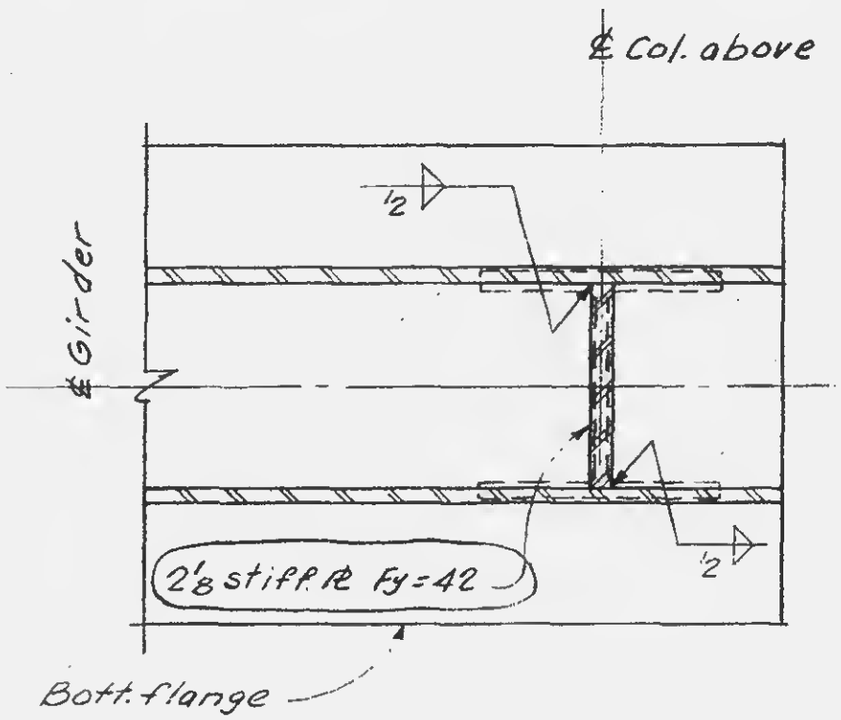
PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 2-29-68

REVISIONS

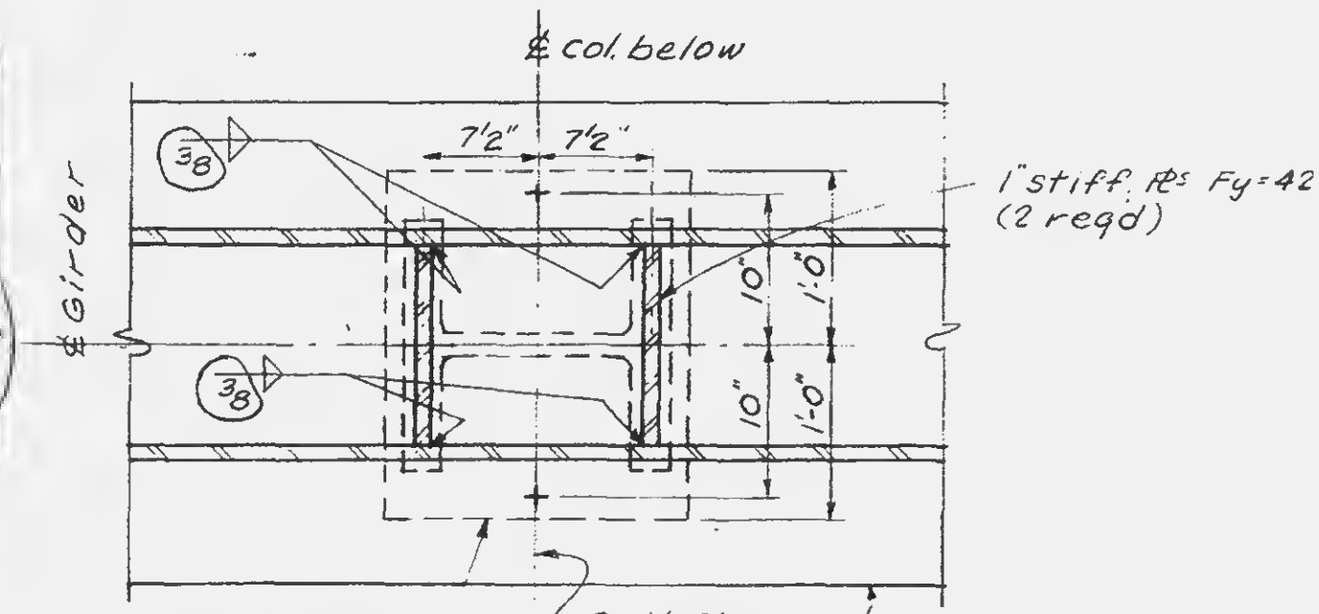
6-28-68



Detail 3



Detail 4



Detail 5

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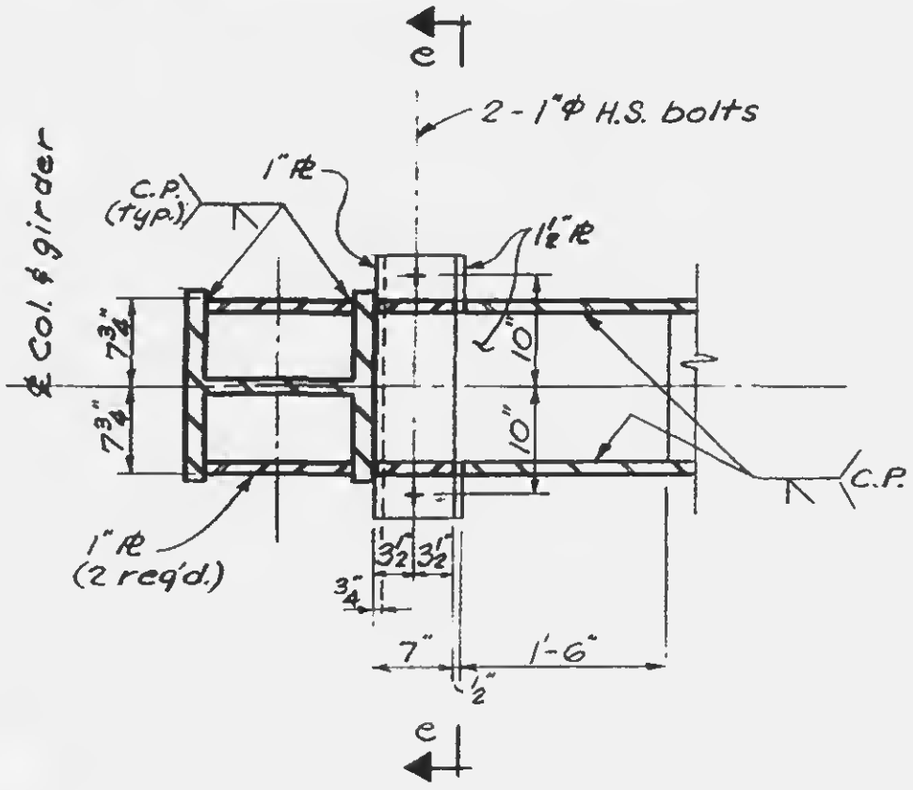
12-JK2-53

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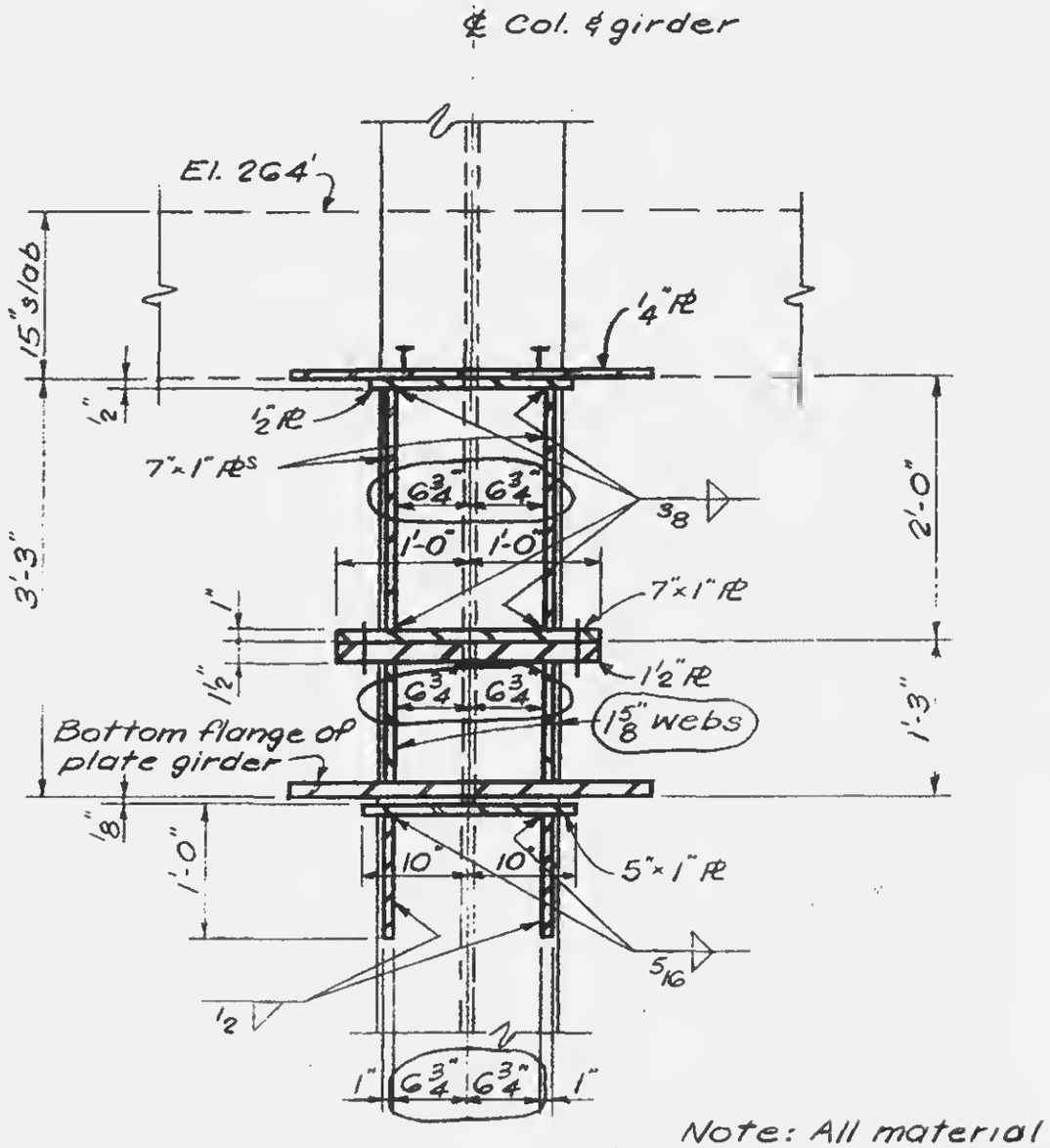
PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 2-29-68

REVISIONS

6-28-68



Detail 6



Note: All material Fy = 42 K.S.I.

Section e-e

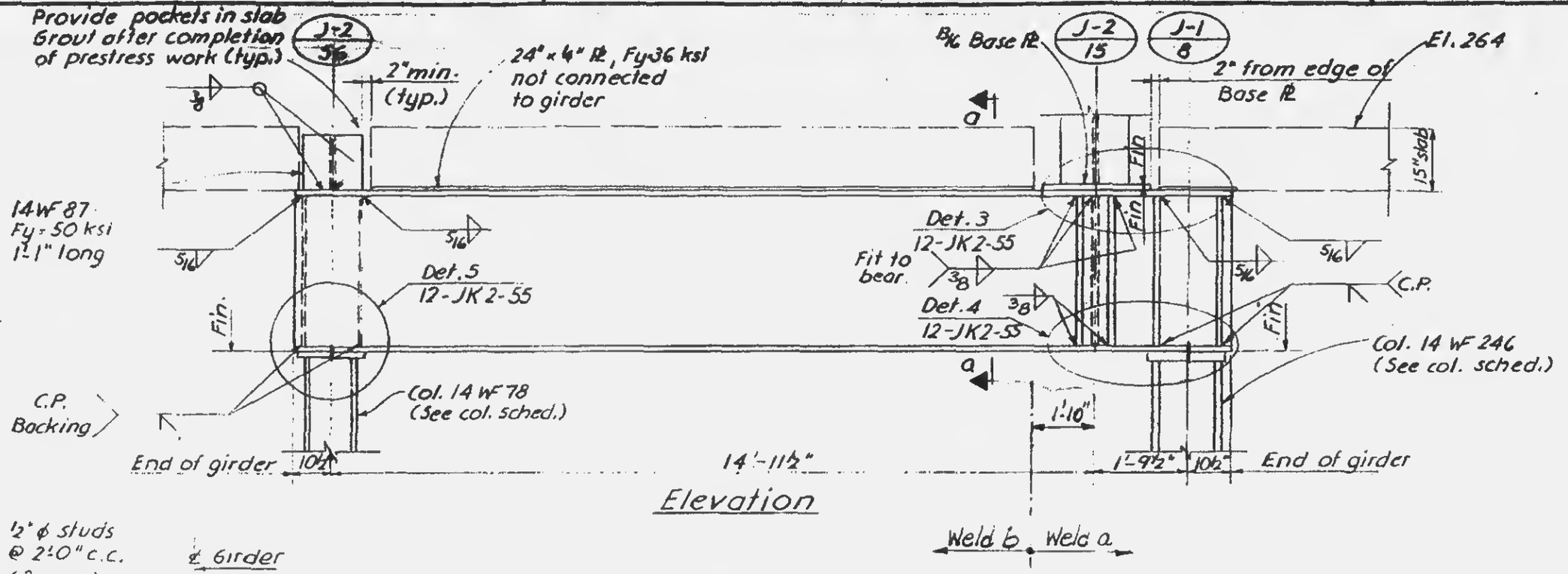
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12-JK2-53A

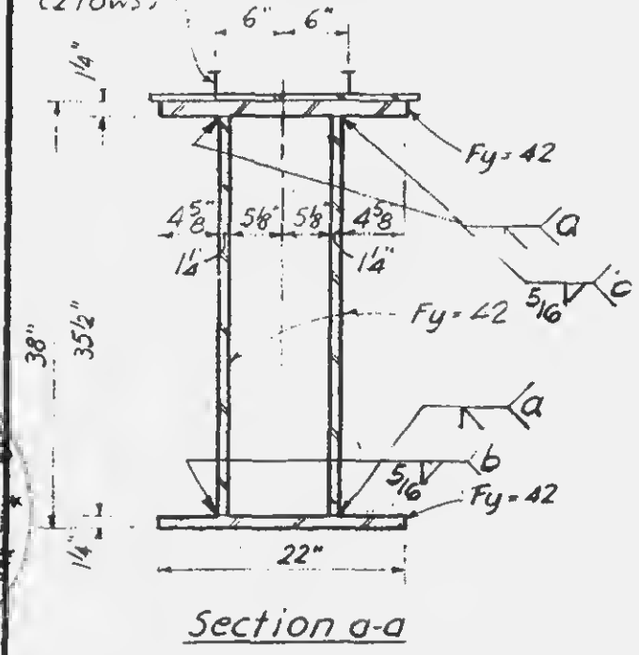
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 2-29-68

REVISIONS
4-5-68
6-28-68
1-3-69



Elevation



Section a-a

Note:
1. All welds to be E70XX.
2. All bolts to be A325 friction type.
3. Col. cap Pl detail similar to Det. 104 (10-JK2-7)

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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DRAWN
S.T.M.
REVIEWED
E.L.

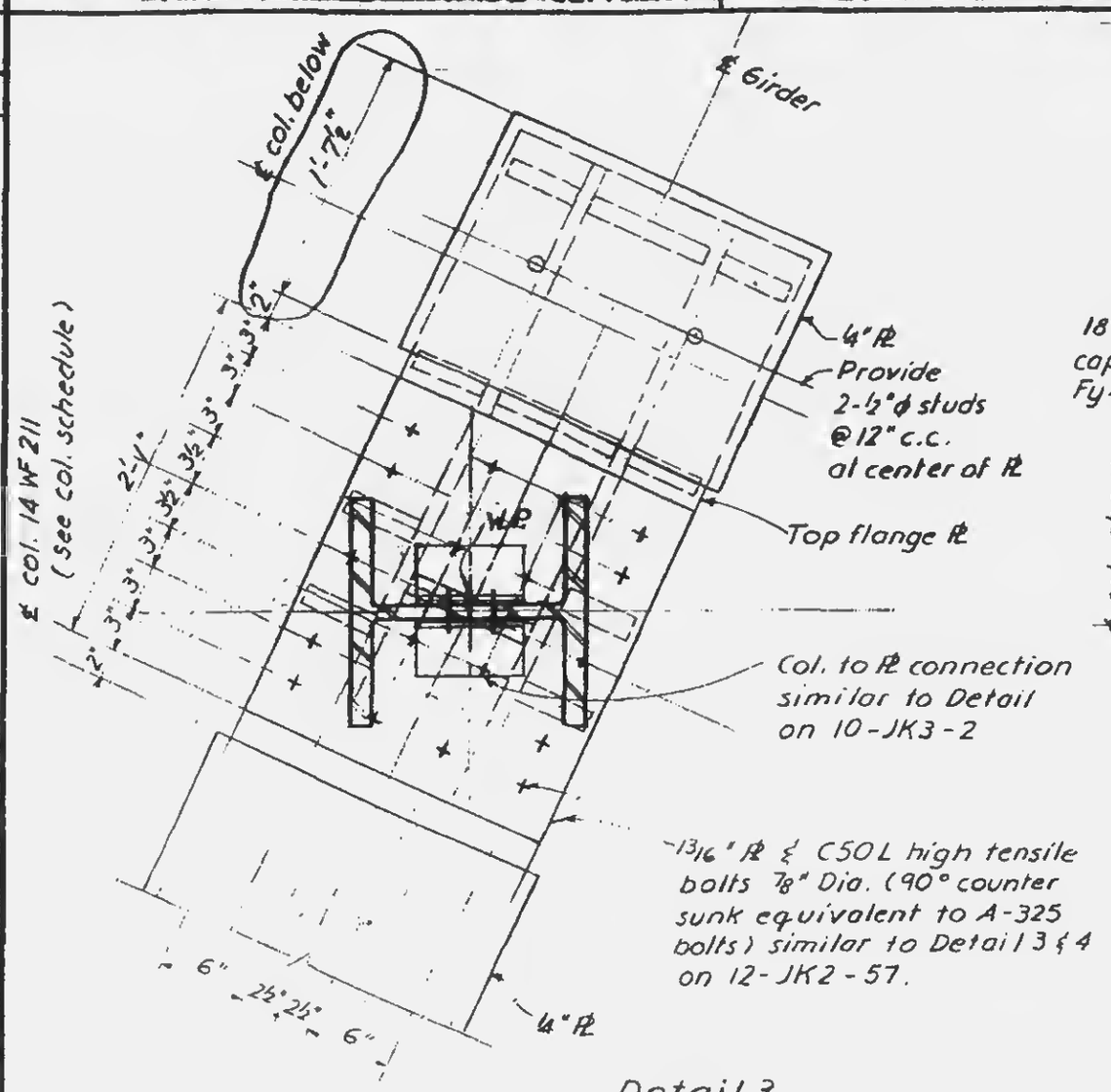
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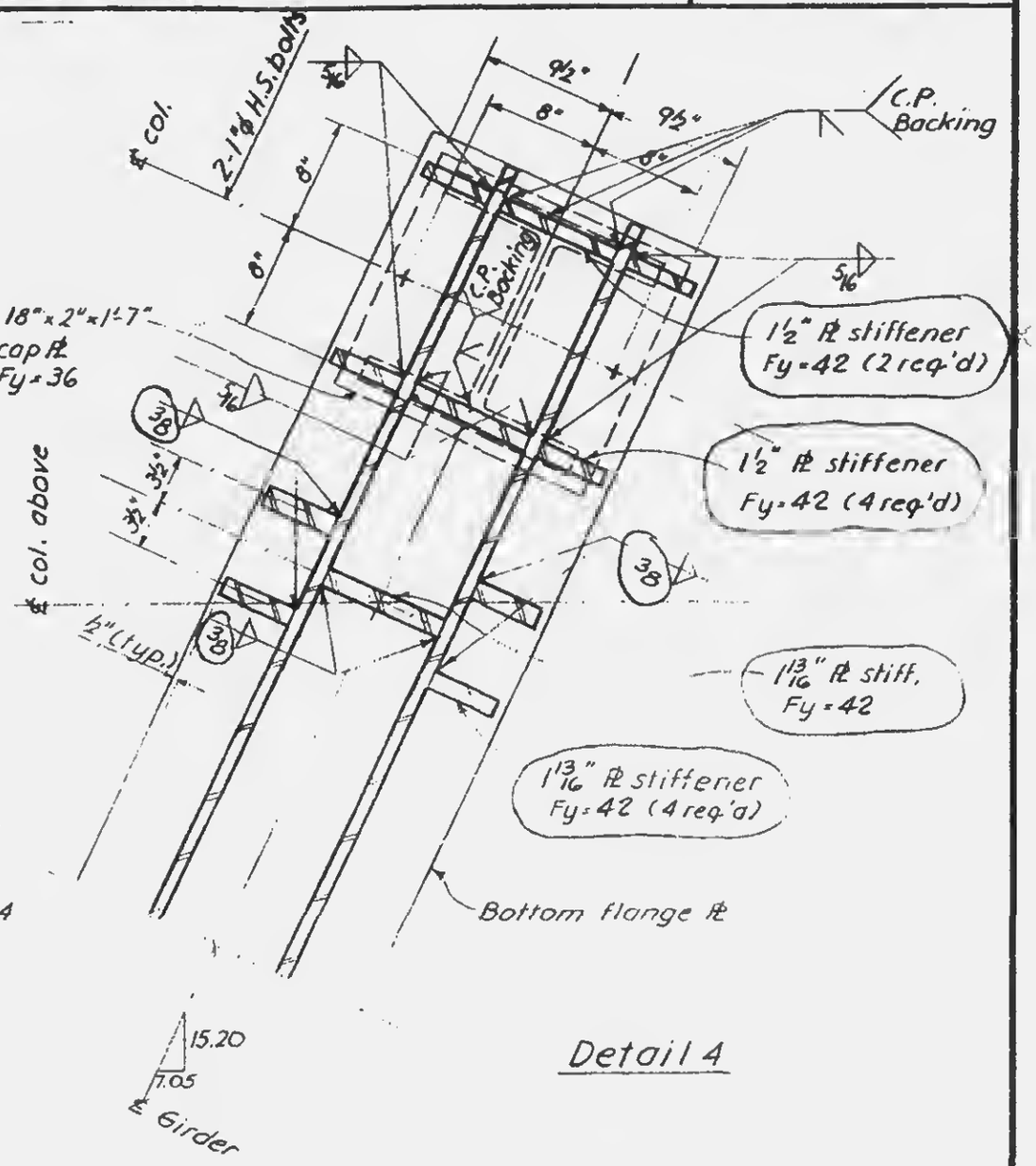
PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 2-29-68

REVISIONS

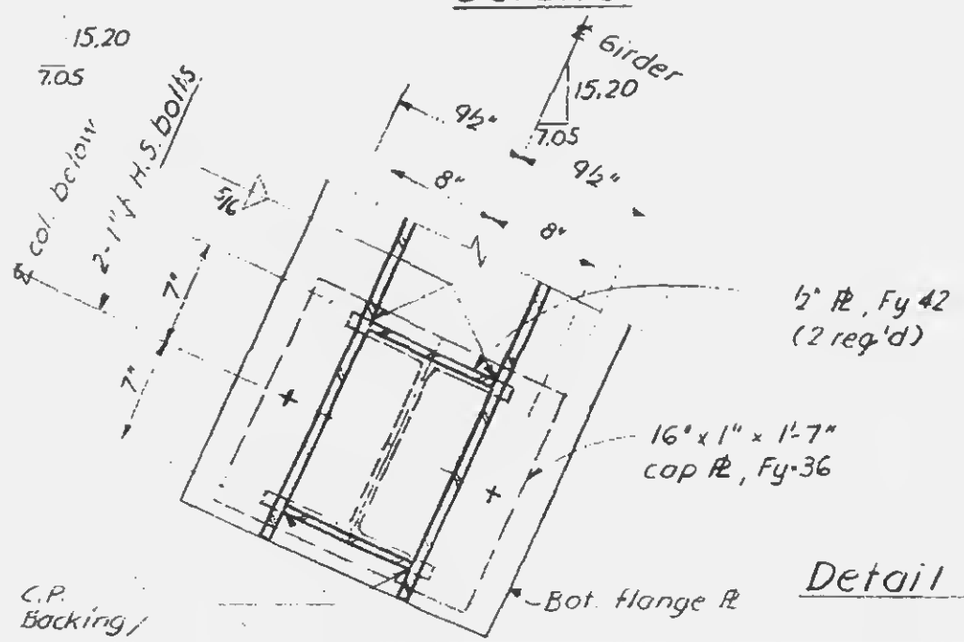
6-28-68



Detail 3



Detail 4



Detail 5

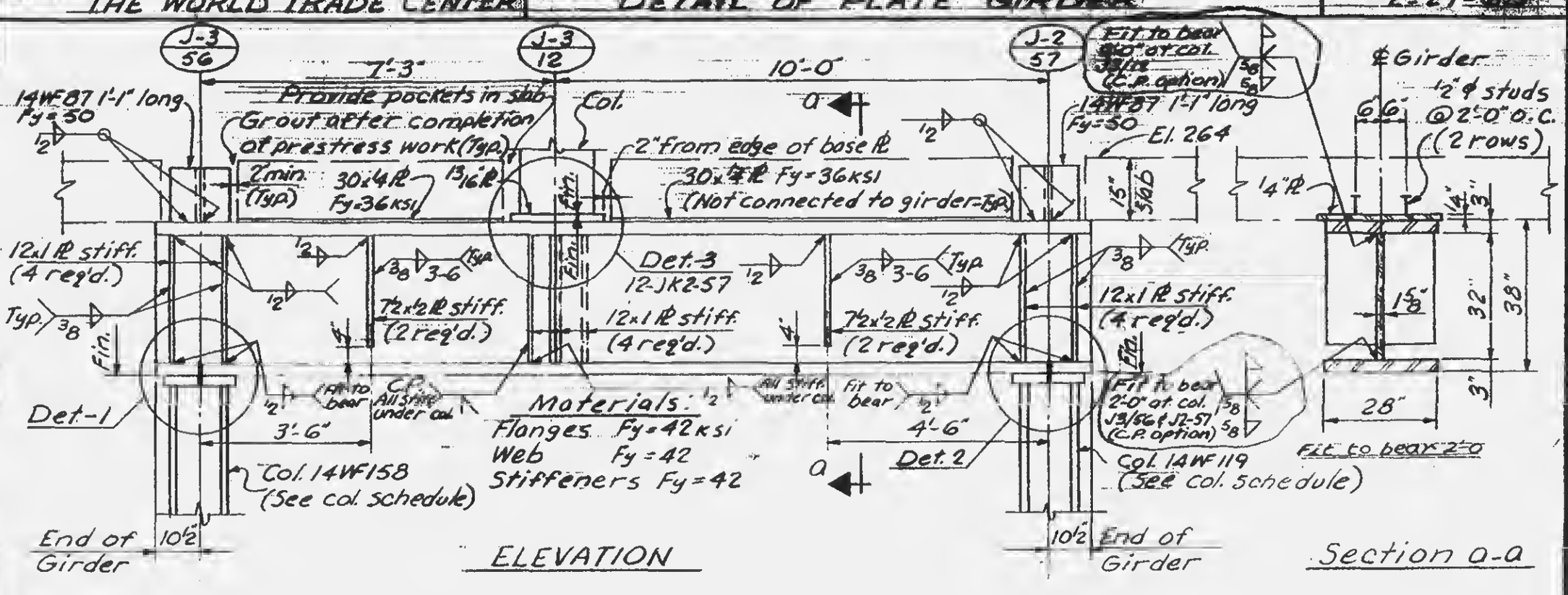
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12-JK2-55

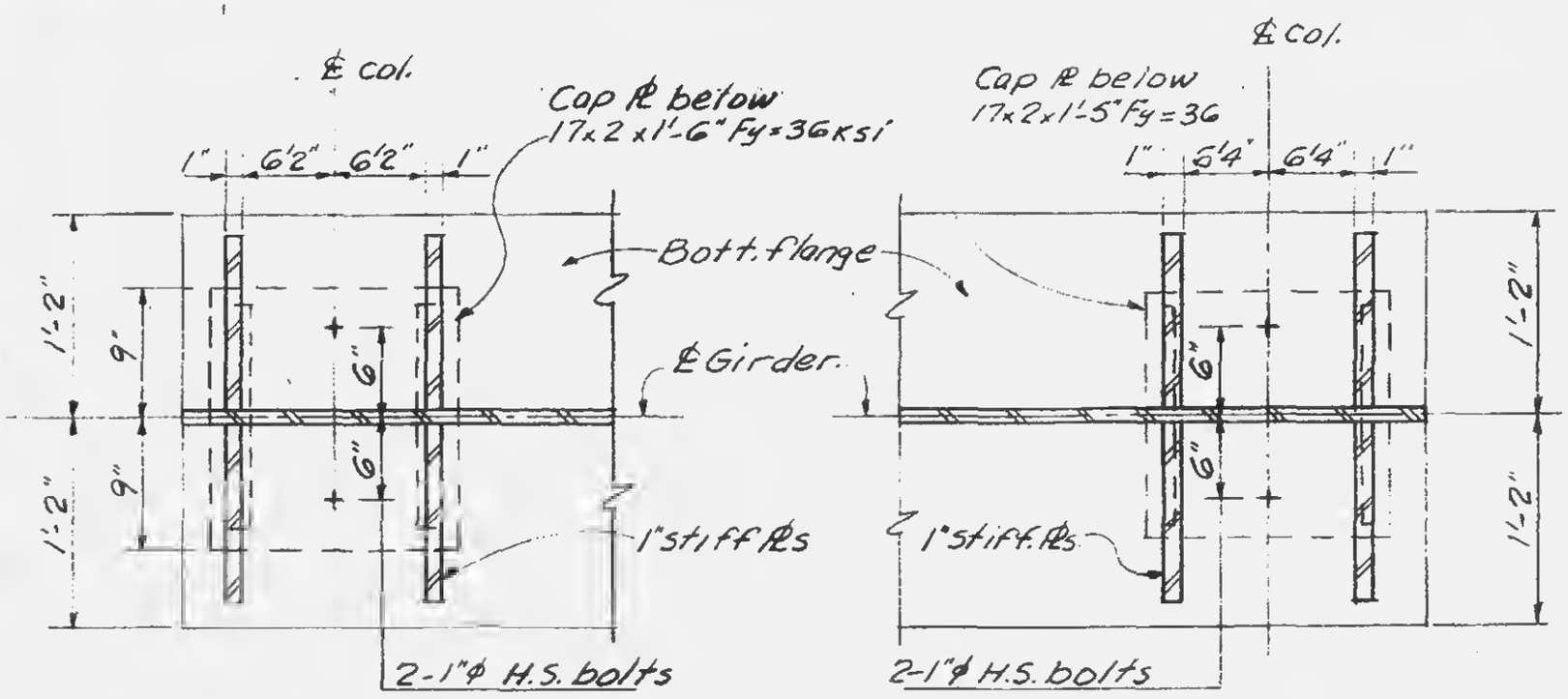
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — STRUCTURAL STEEL ENGINEERS

PROJECT THE WORLD TRADE CENTER — TITLE DETAIL OF PLATE GIRDER — DATE 7-29-68

REVISIONS
6-28-68
1-3-69



Materials:
Flanges Fy=42 ksi
Web Fy=42
Stiffeners Fy=42



Detail-1 — Detail-2

Notes:
1. All welds to be E70xx
2. All bolts to be A-325 friction type.
3. Col. cap PL Detail similar to Detail 104 (16-JK2-7.)

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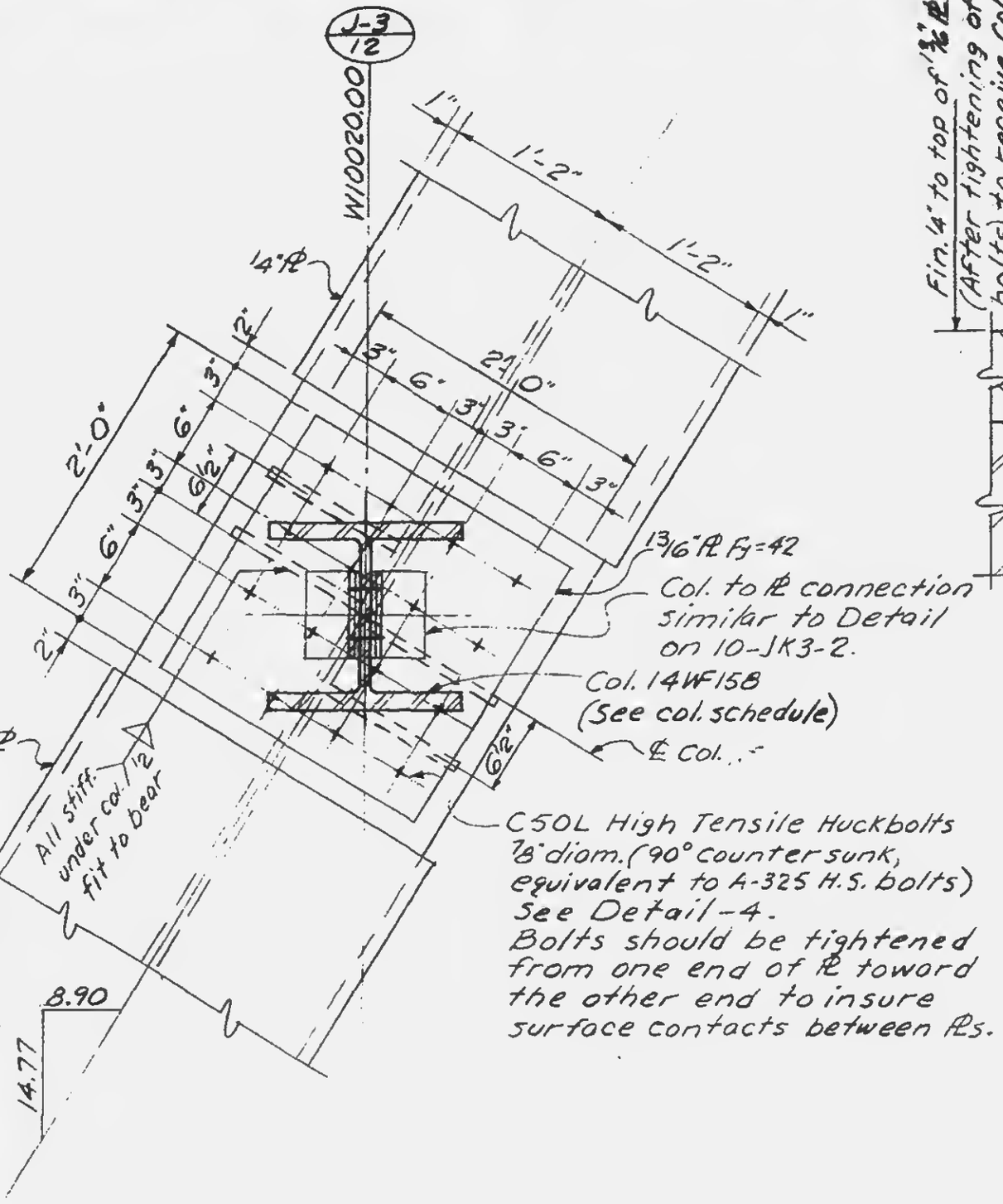
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12-JK2-56

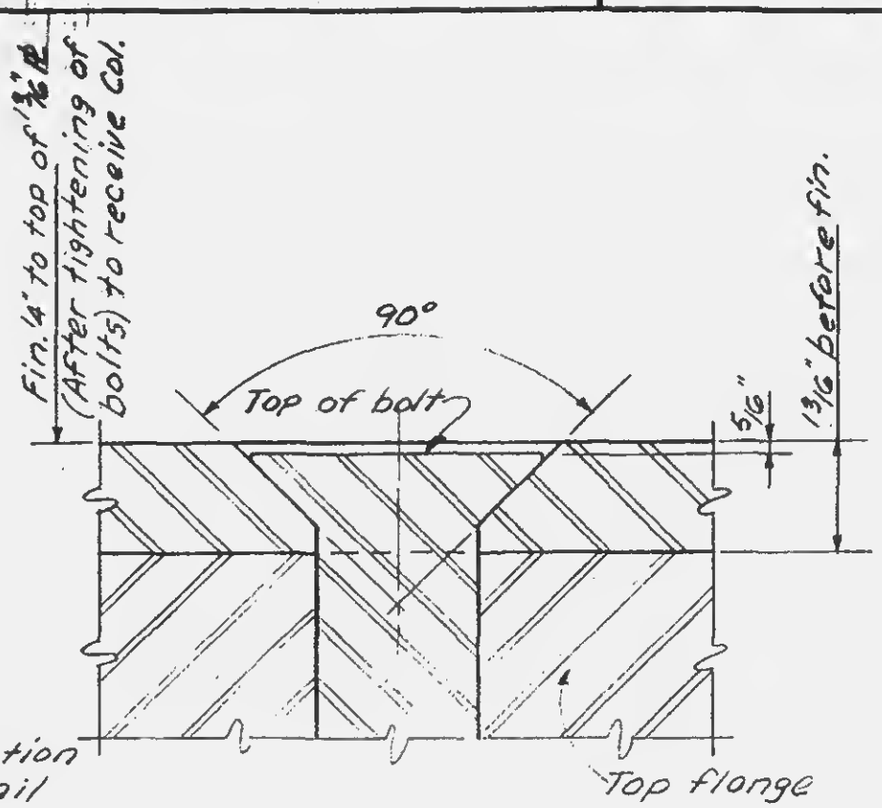
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 2-29-68

REVISIONS



Detail - 3



Detail - 4

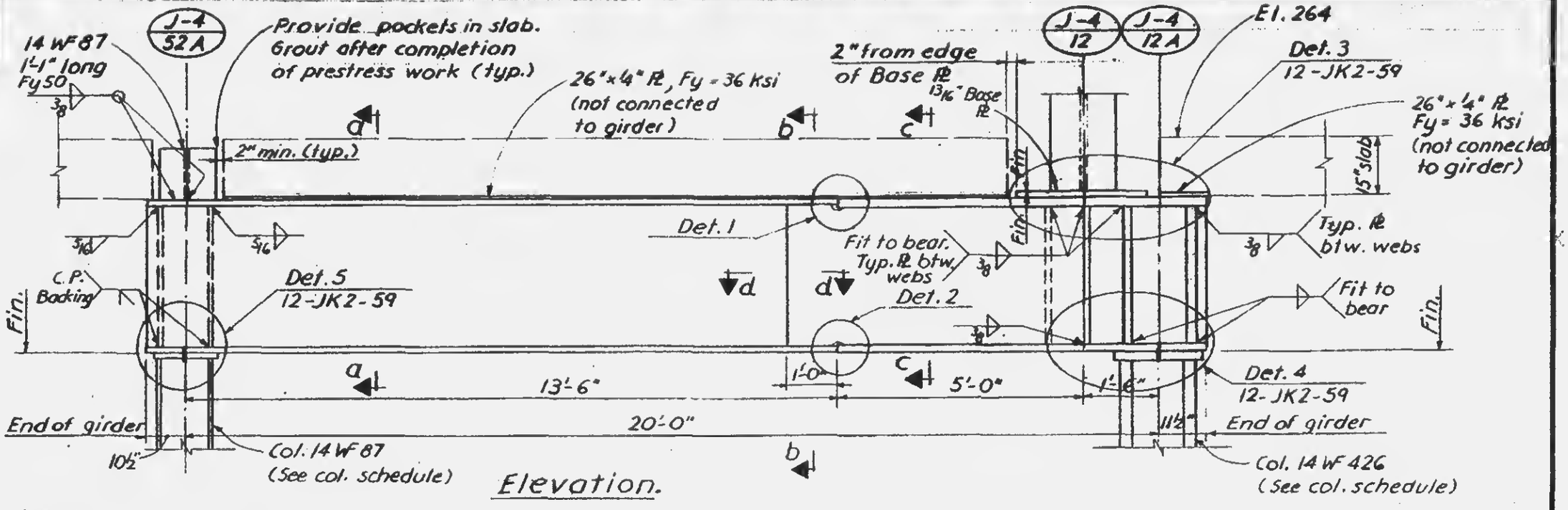
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NO. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-57

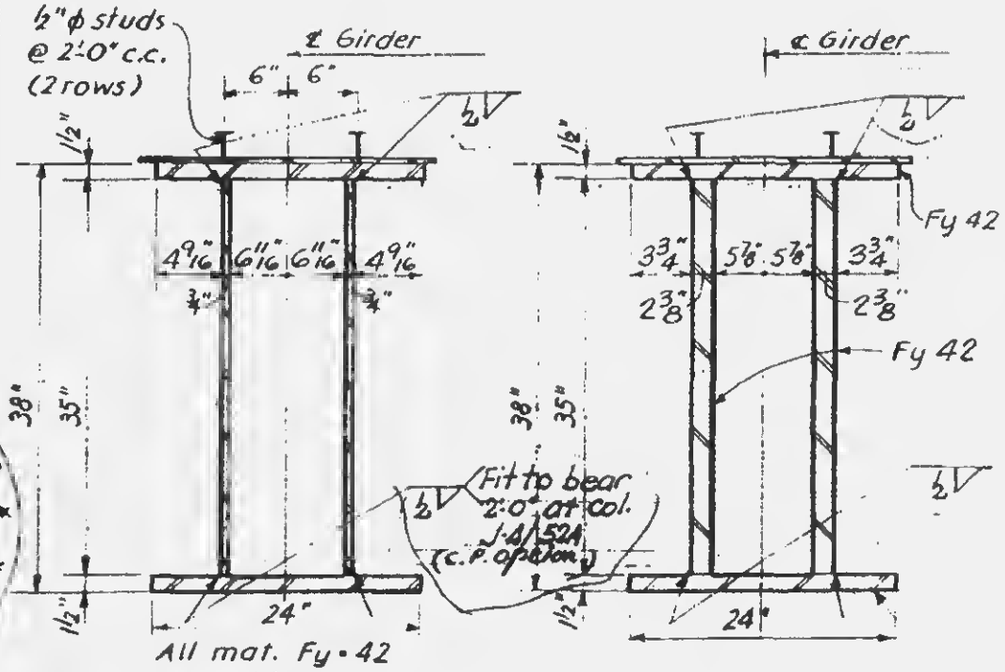
LESLIE E. ROBERTSON — Structural & Civil Engineers

PROJECT: LONG BEACH - GARAGE — TITLE: DETAIL OF PLATE GIRDER

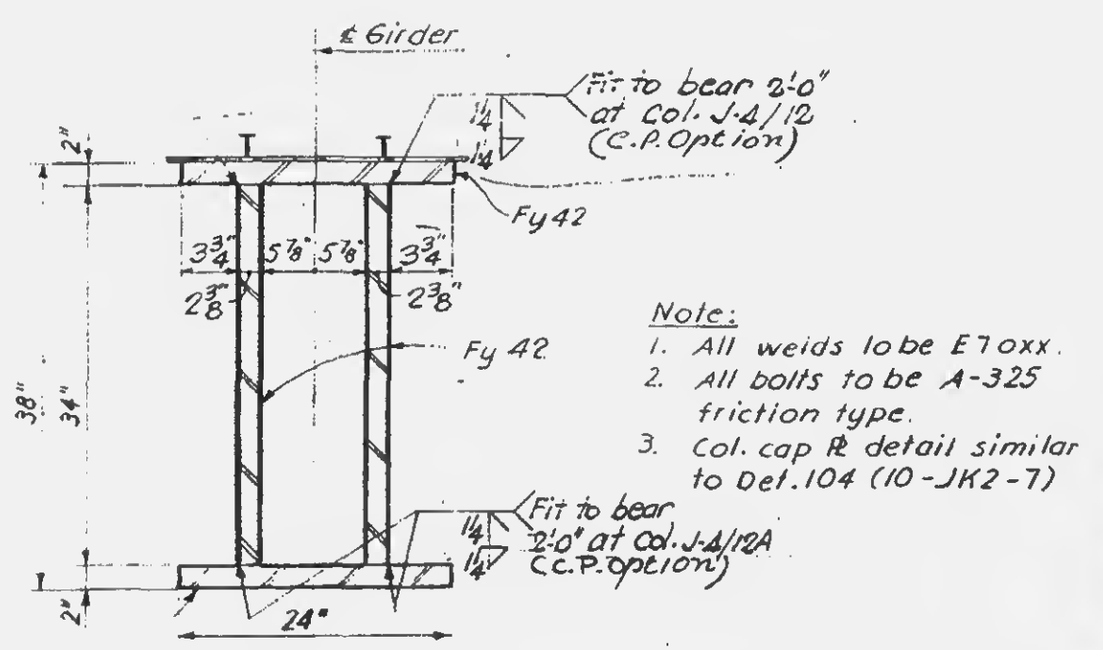
REVISIONS
6-28-68
1-3-69



Elevation.

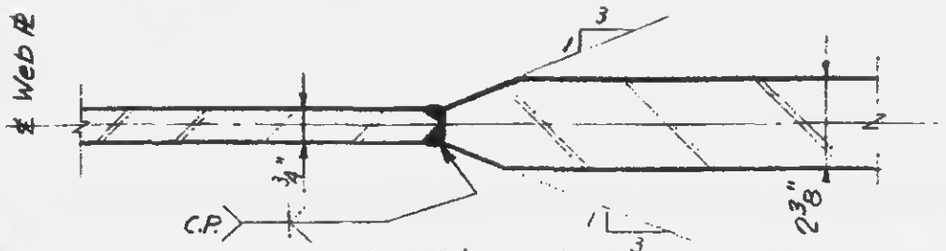


Section a-a — Section b-b

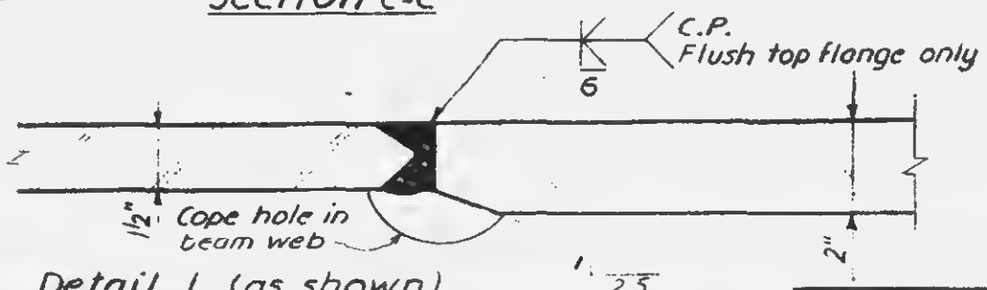


Section c-c

Note:
1. All welds to be E70xx.
2. All bolts to be A-325 friction type.
3. Col. cap Pl detail similar to Det. 104 (10-JK2-7)



Section d-d



Detail 1 (as shown)
Detail 2 (reflected)

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DRAWN S.T.M.
REVIEWED E.L.

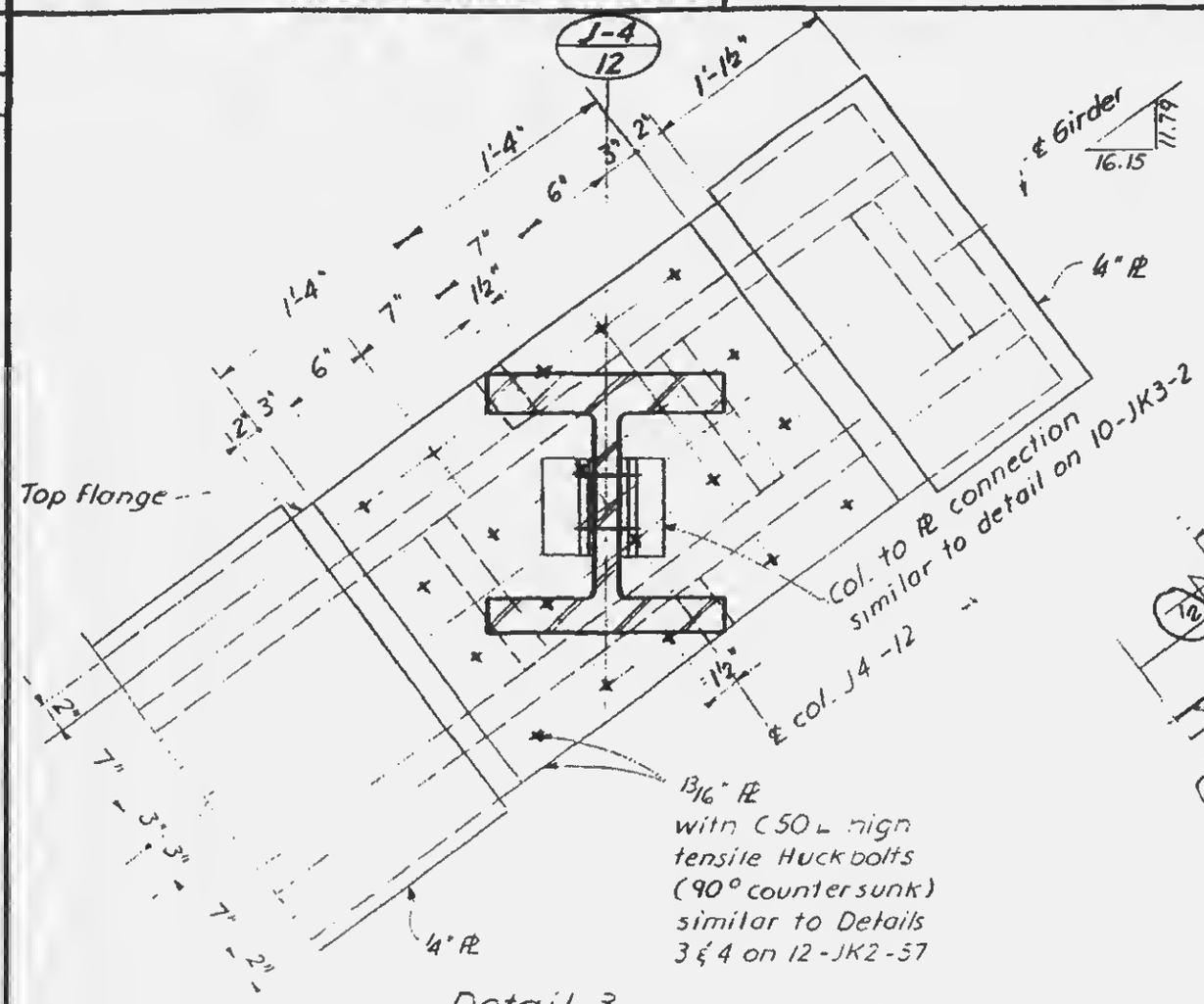
12-JK2-58

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

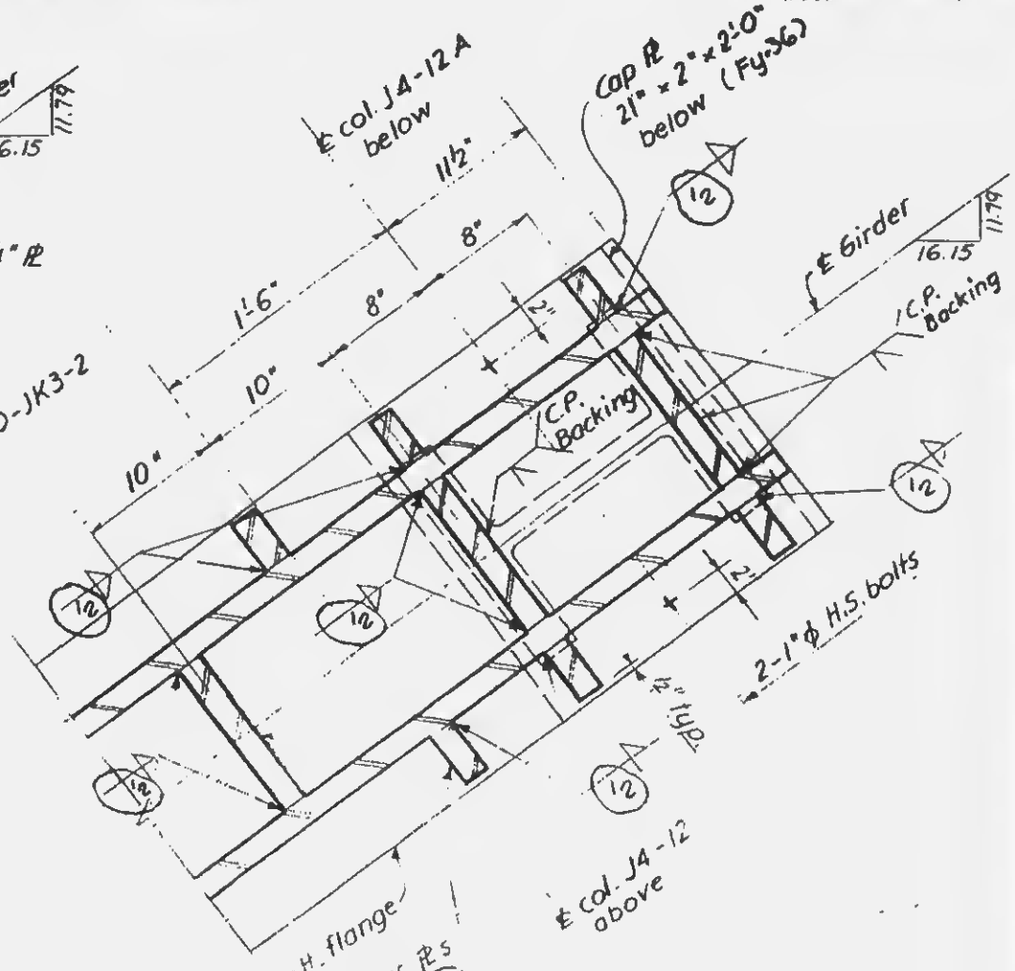
PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 2-29-68

REVISIONS

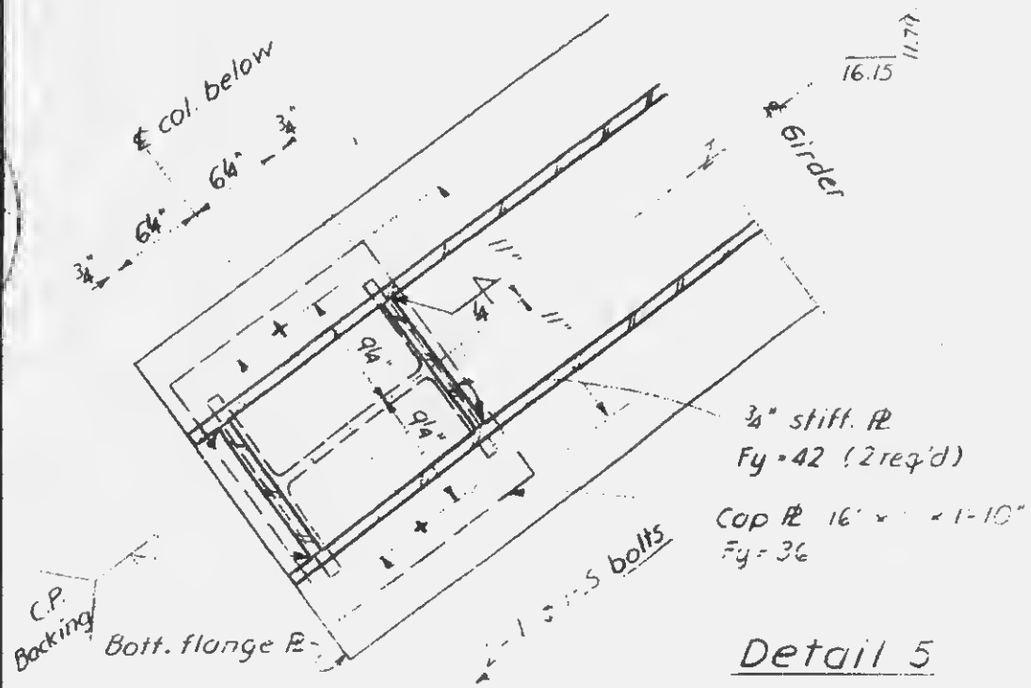
6-28-68



Detail 3



Detail 4



Detail 5

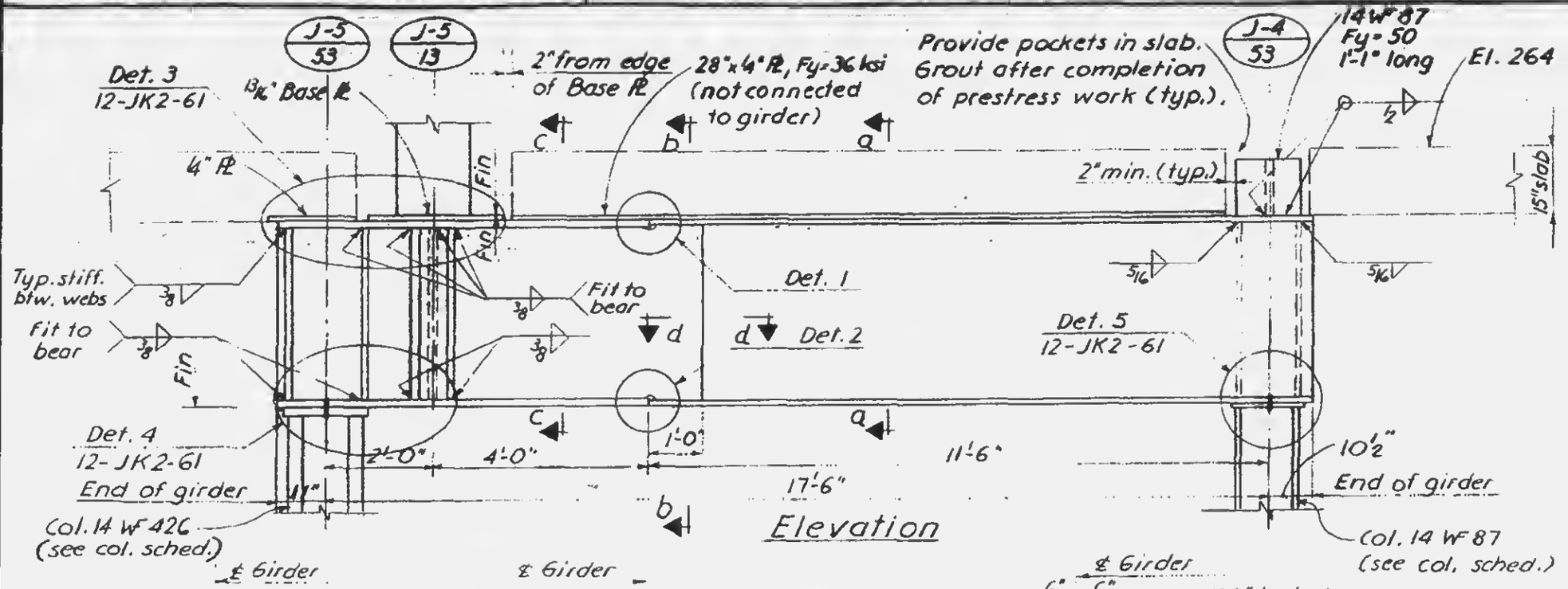
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
NO. 34360
UNIVERSITY OF THE STATE OF NEW YORK

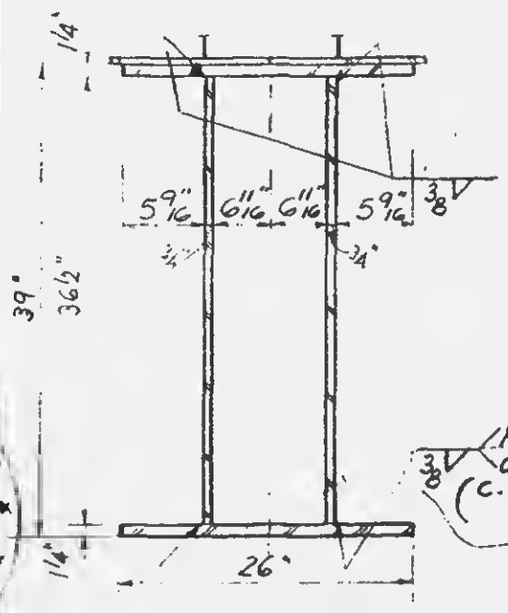
12-JK2-59

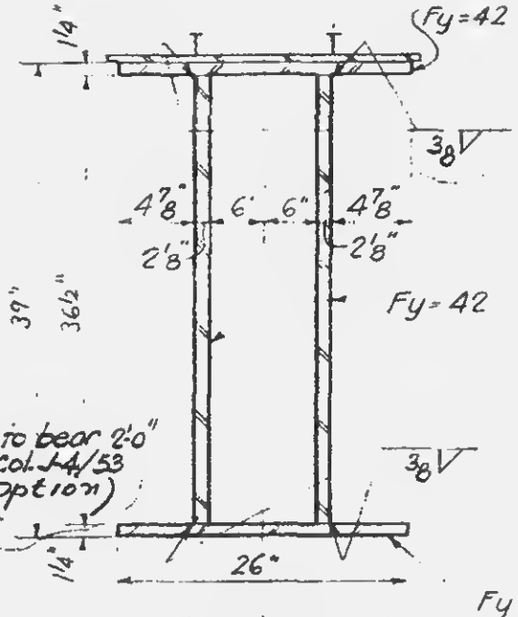
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

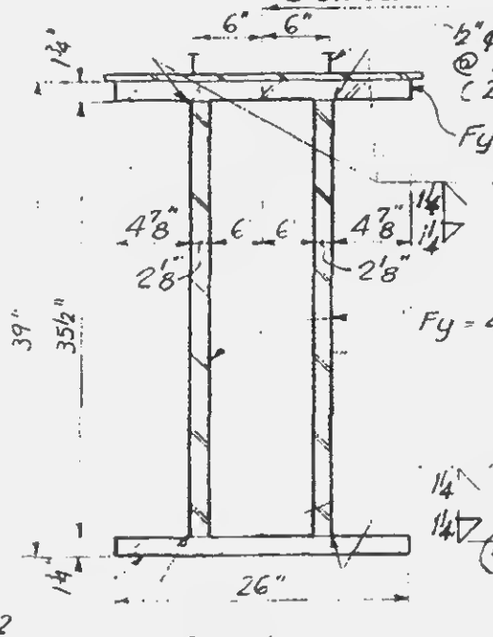
PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 2-29-68

REVISIONS
6-28-68
1-3-69



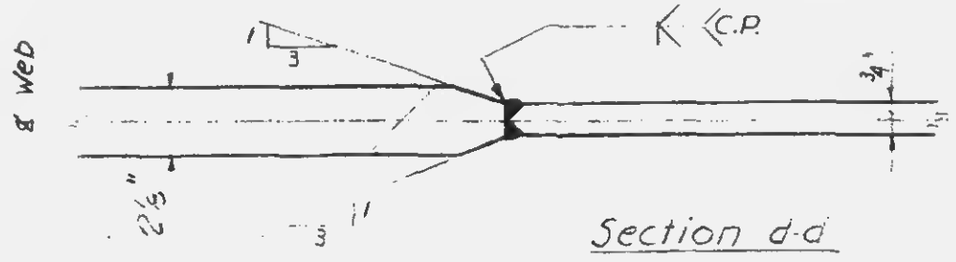


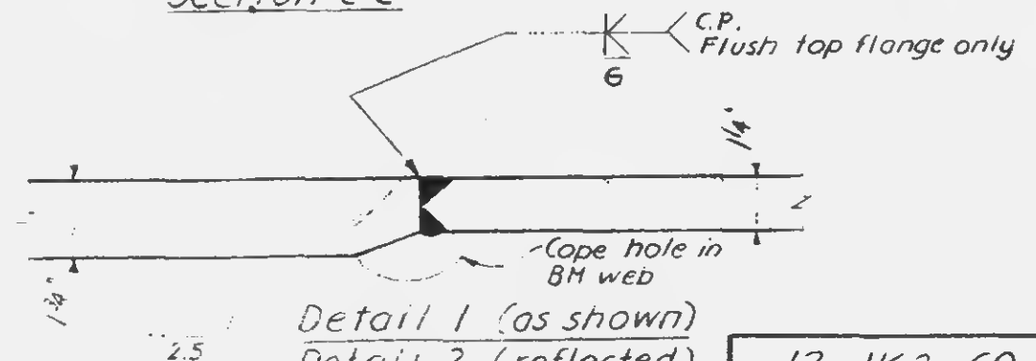




Note:
1. All welds to be E70XX
2. All bolts to be A-325 friction type.
3. Col. cap Pl. detail similar to Detail 104 (IC-JK2-7)

Fy 42





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DRAWN S.T.M.
REVIEWED E.L.

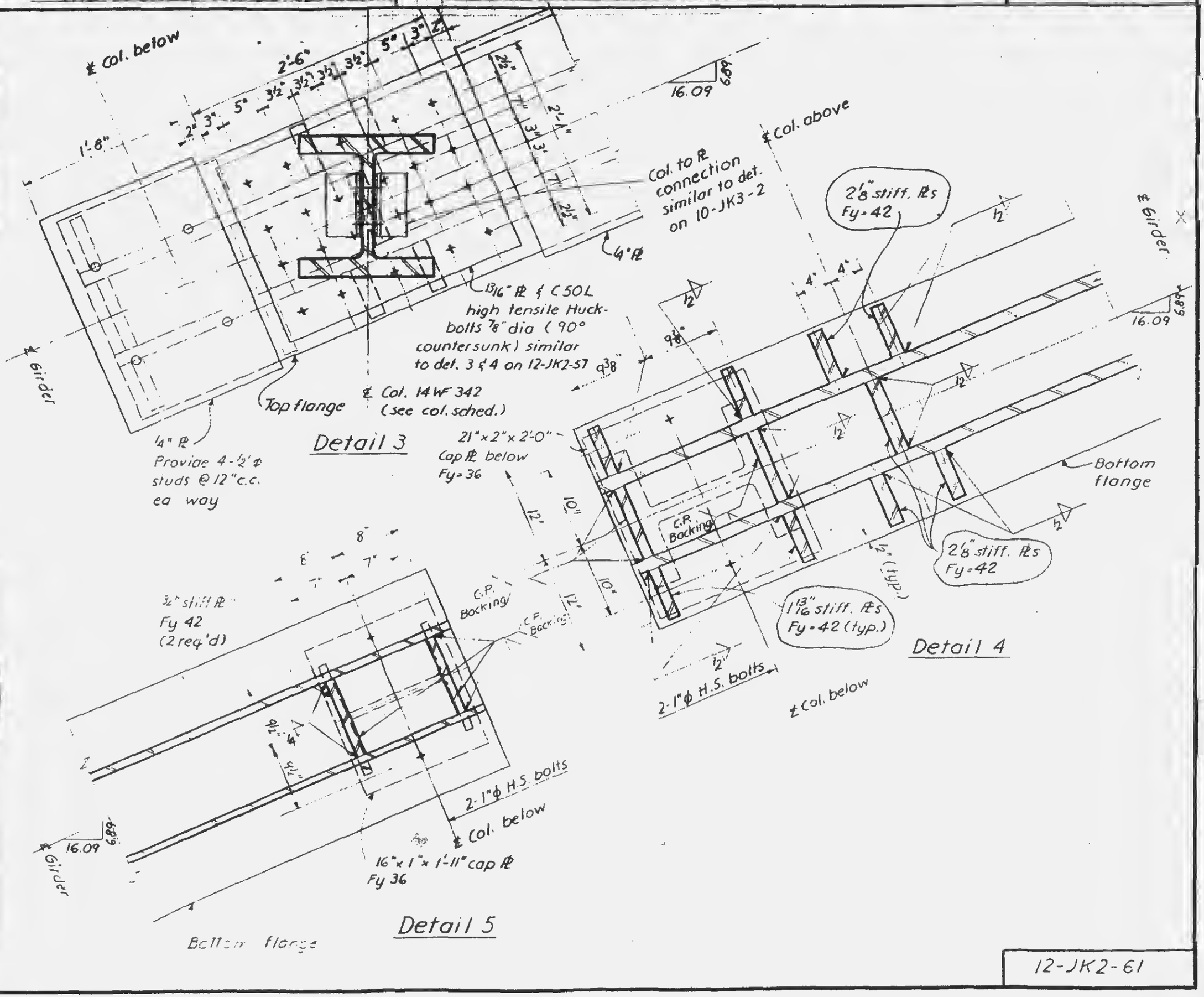
12-JK2-60

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 2-29-68

REVISIONS

6-28-68



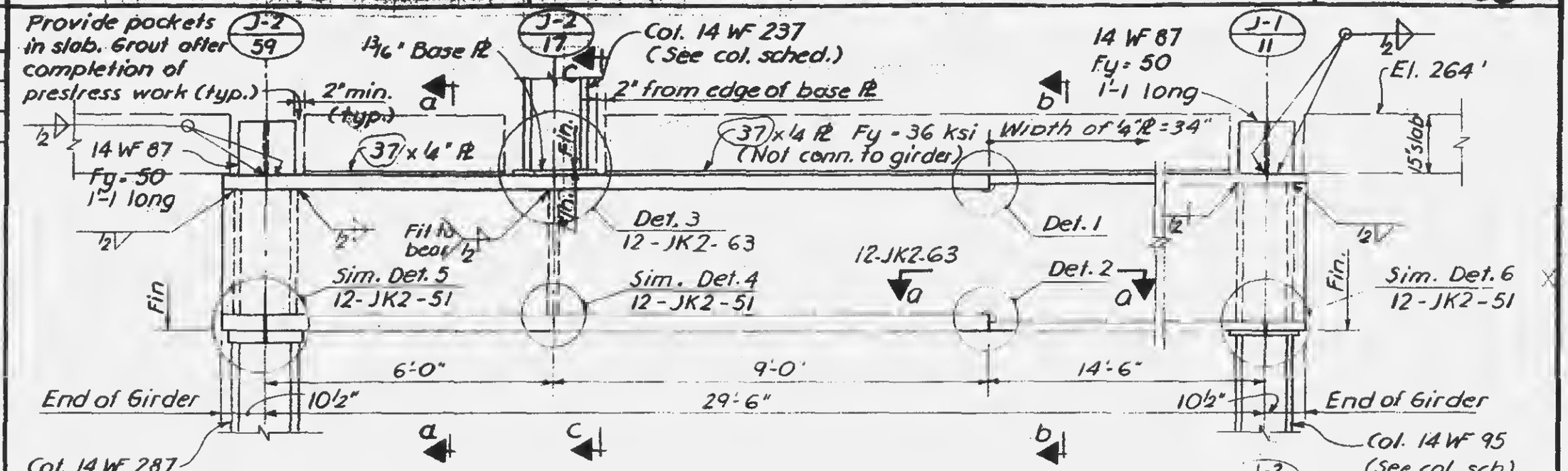
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

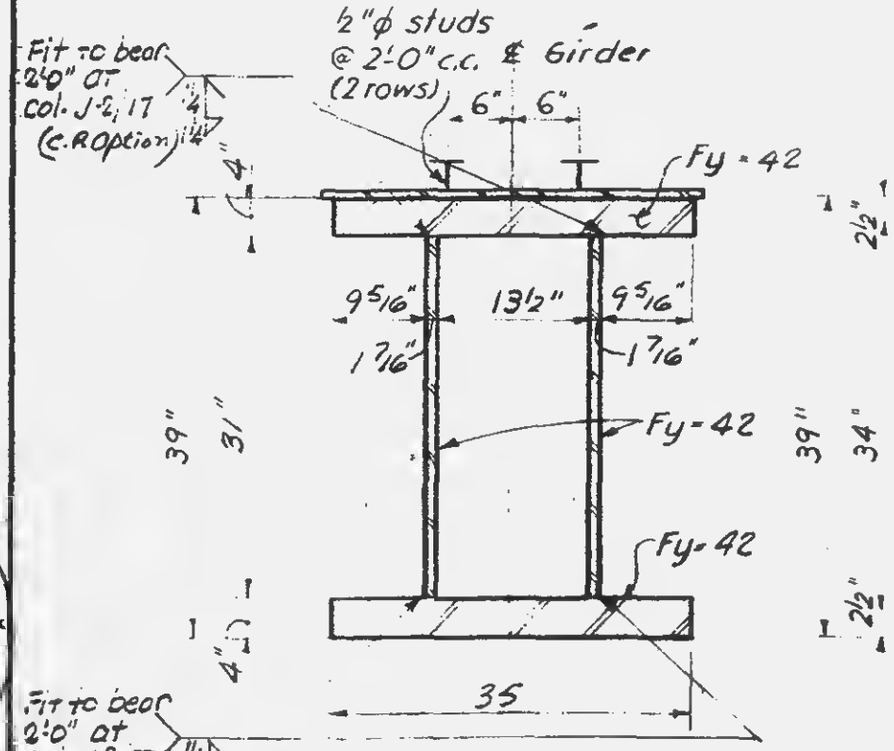
12-JK2-61

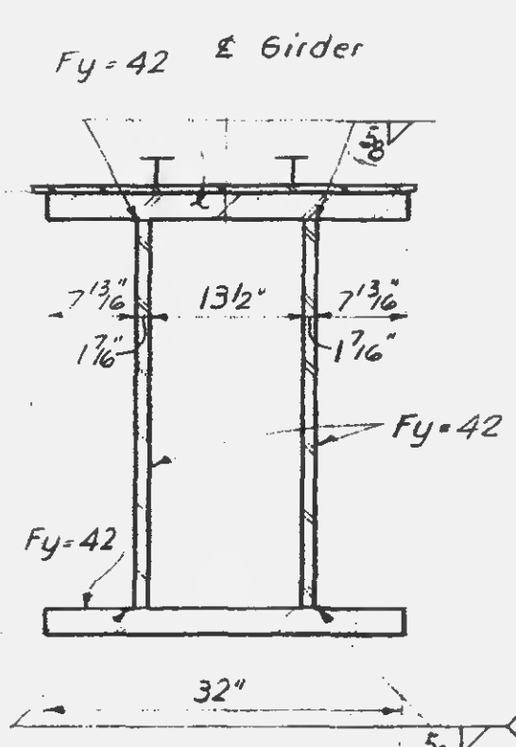
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

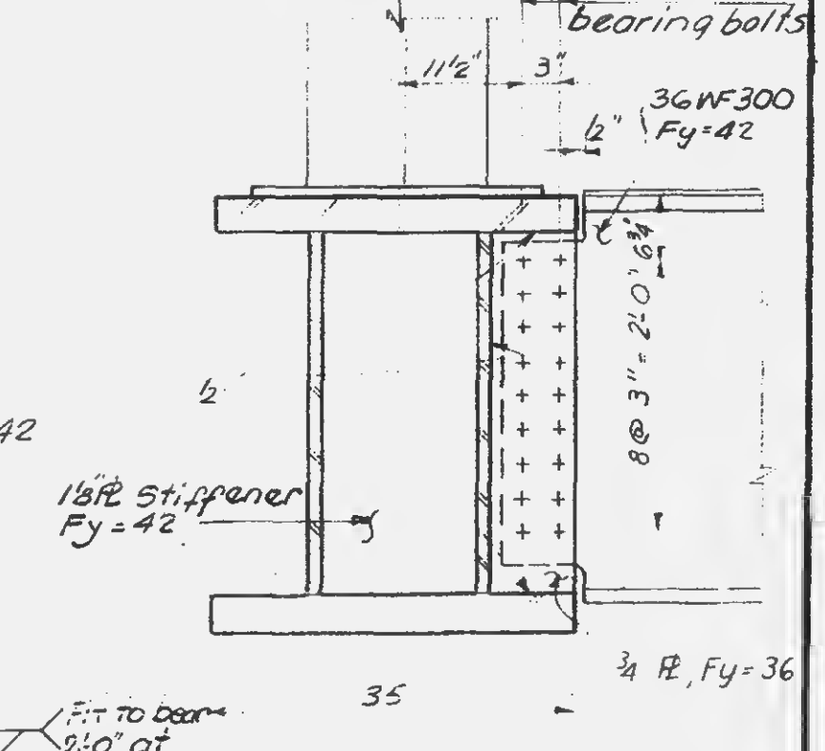
PROJECT: THE NORTH TONAWANDA — DETAIL OF PLATE GIRDER — DATE: 5-1-68

REVISIONS
6-7-68
7-19-68
1-3-69









Note:
1. All welds to be E 70xx
2. All bolts to be A325 friction type, unless noted.
3. Col. cap Pl Detail similar to Detail 104 (10-JK2-7)

Detail 1 (as shown)
Detail 2 (reflected)

LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON

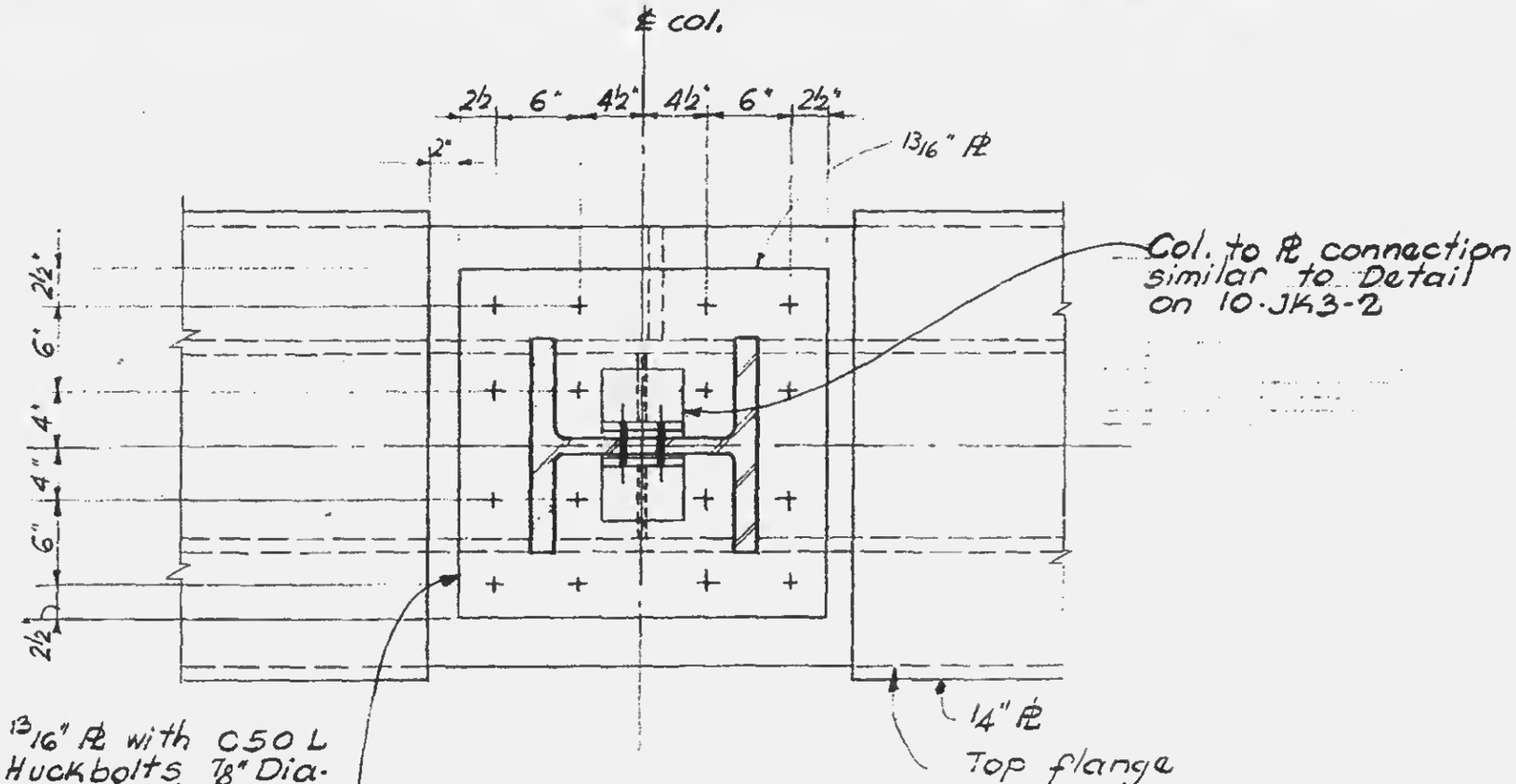
DRAWN S.T.M.
REVIEWED E.L.

12-JK2-62

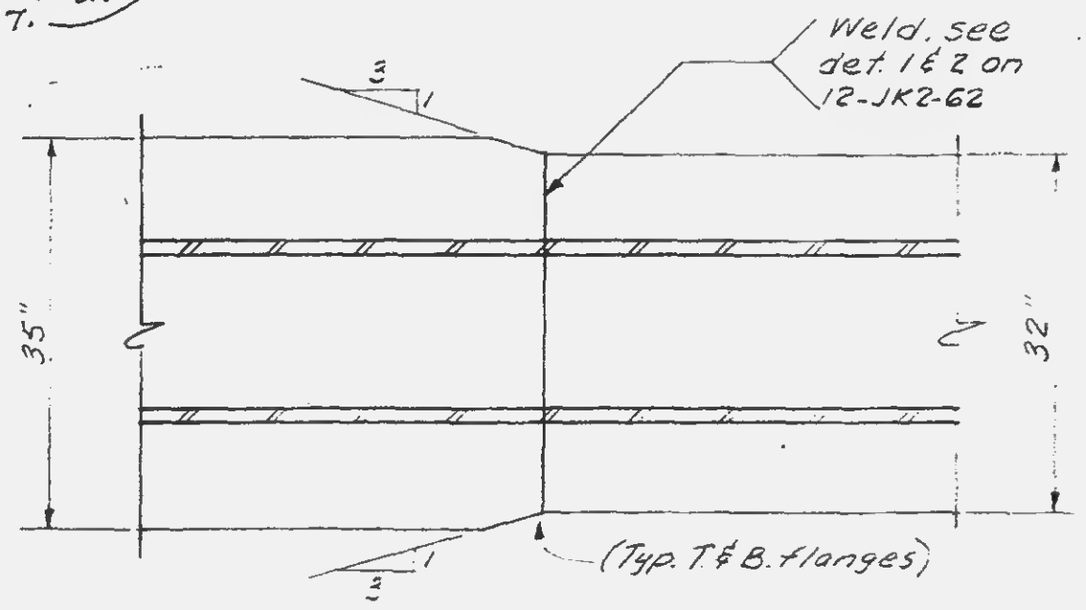
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 5-1-68

REVISIONS
7-19-68



Detail 3



Section a-a

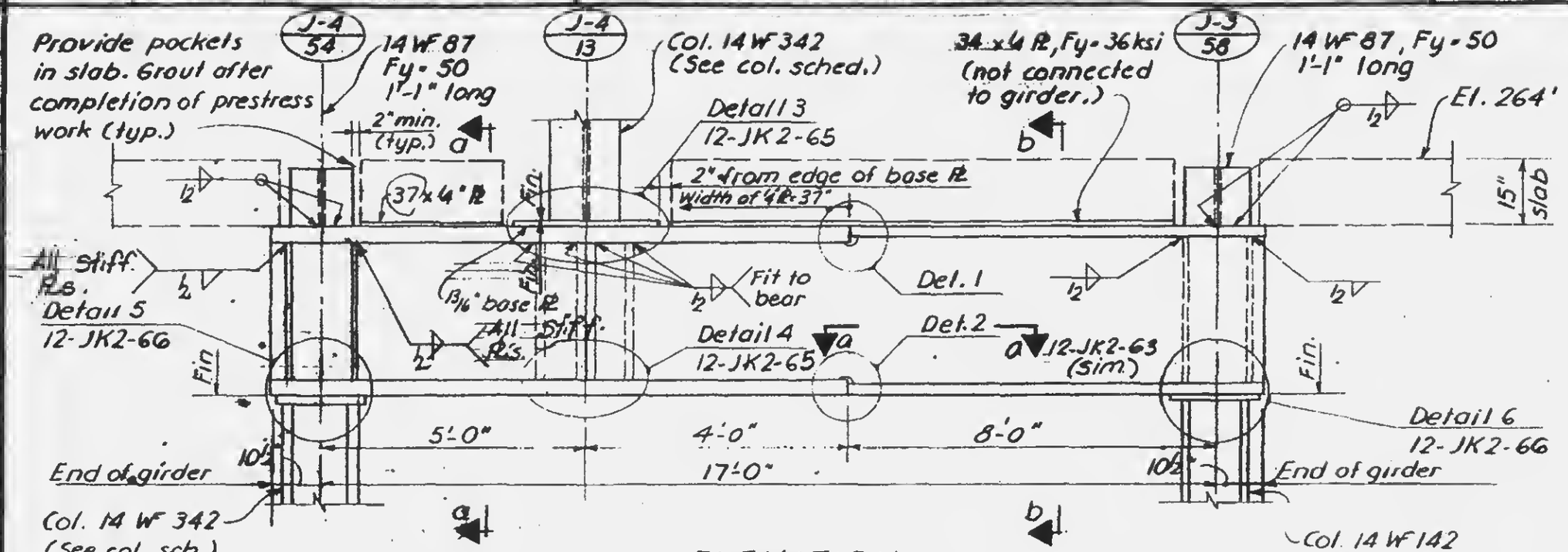
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-63

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PROJECT: THE WORLD TRADE CENTER | TITLE: DETAILS OF PLATE GIRDER | DATE: 5-1-68

EVISIONS
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1-3-69



Note:
1. All welds to be E 70 xx
2. All bolts to be A-325 friction type.
3. Col. cap PL Detail similar to Detail 104 (10-JK2-7)

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 24360 — UNIVERSITY OF THE STATE OF NEW YORK

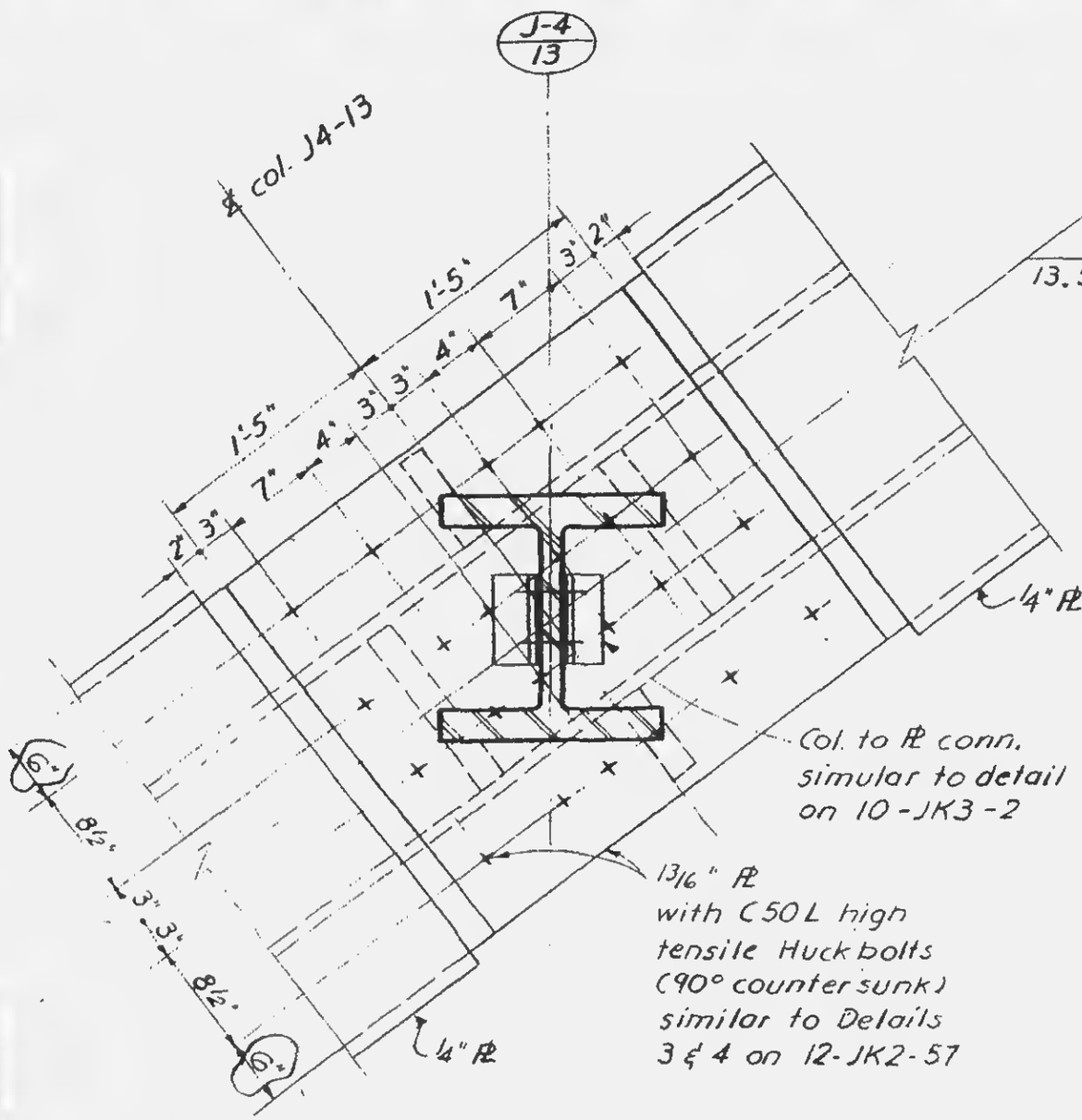
DRAWN S.T.M.
REVIEWED E.L.

12-JK2-64

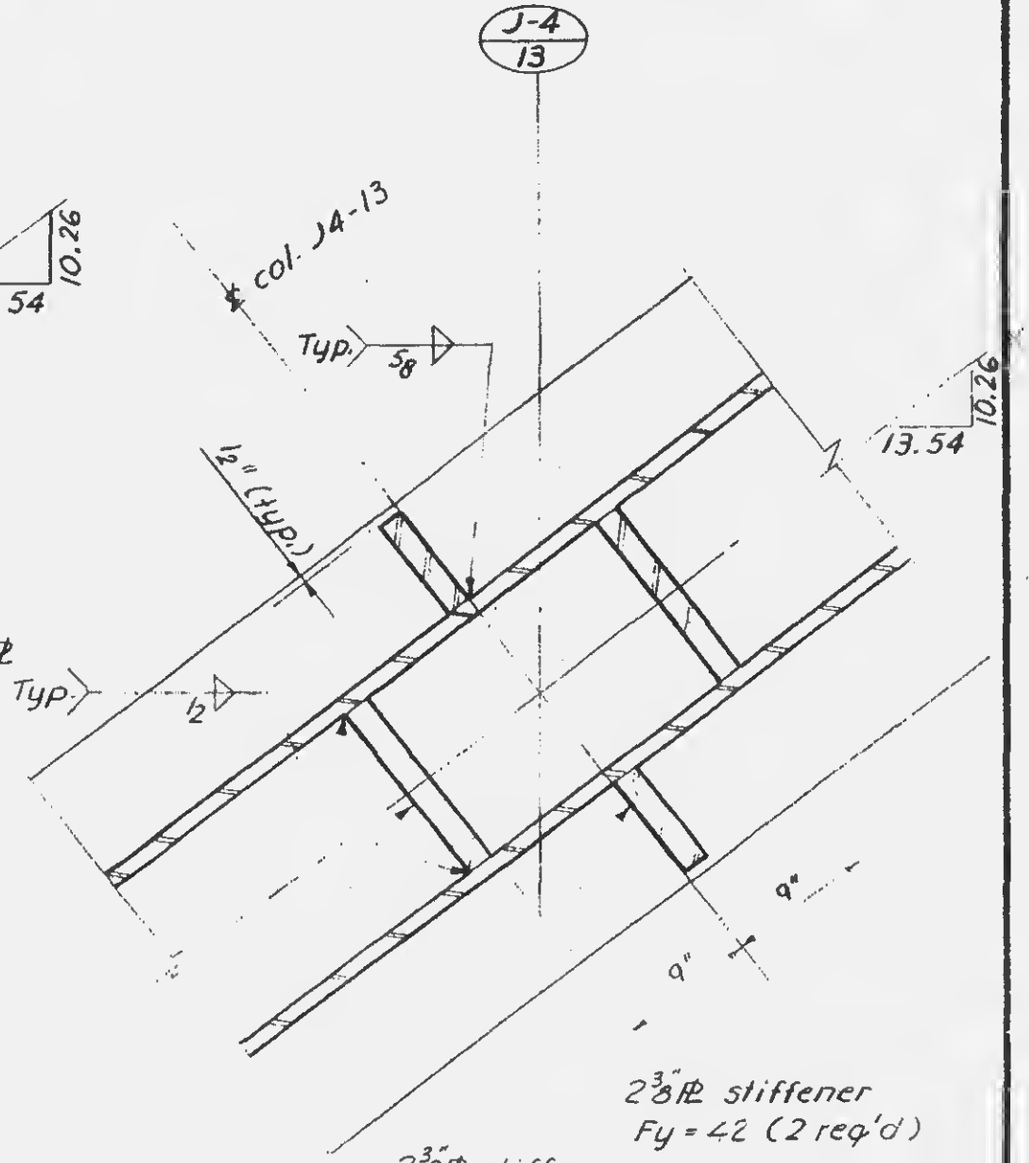
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 5-1-68

REVISIONS
7-19-68
10-15-68



Detail 3



Detail 4

REGISTERED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
STATE OF NEW YORK

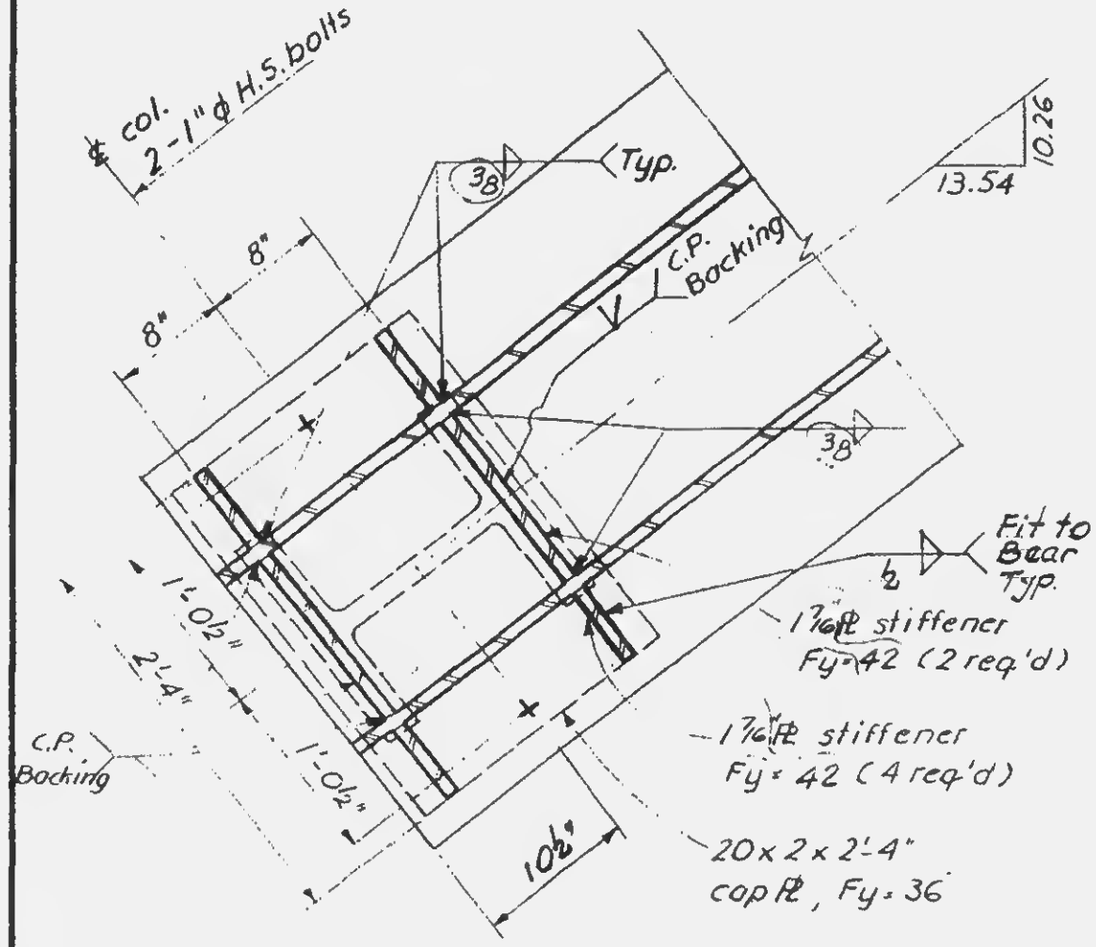
12-JK2-65

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

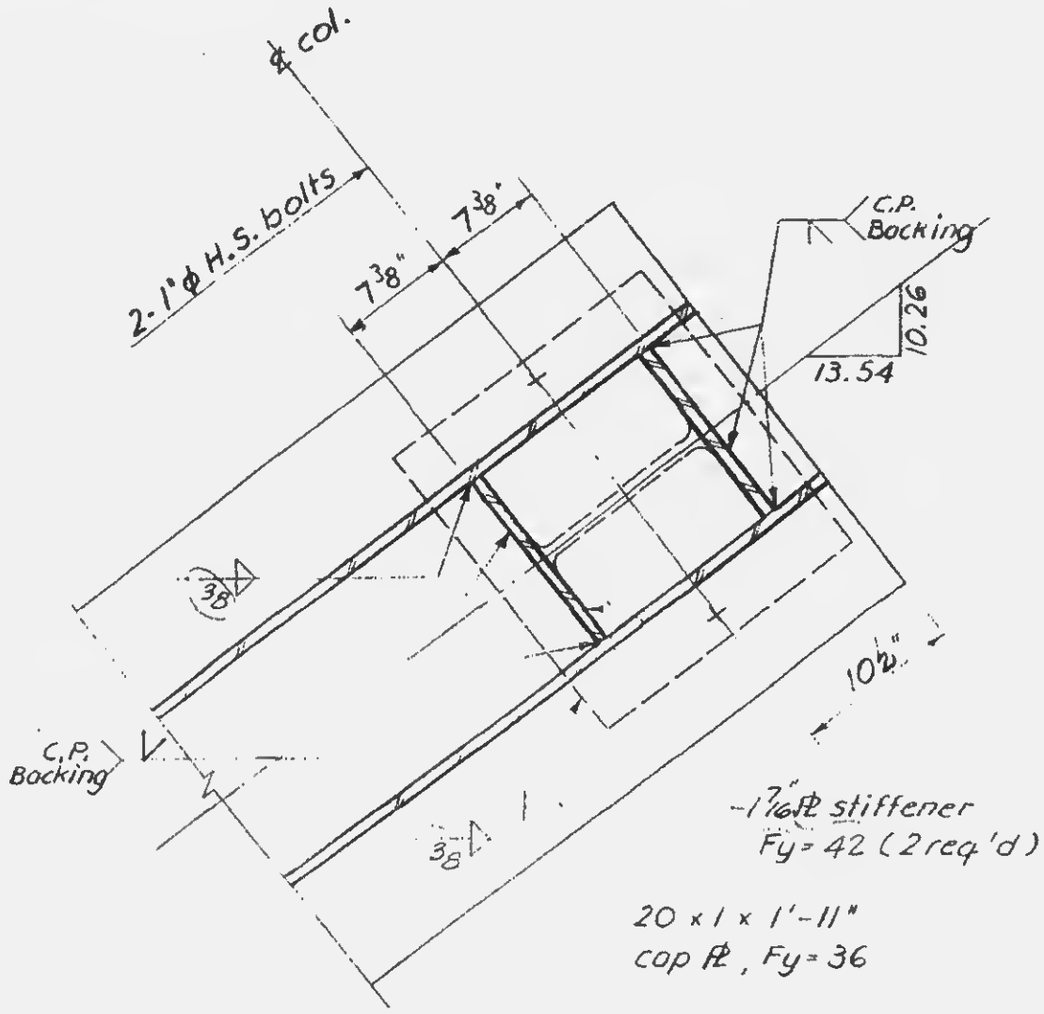
PROJECT THE WORLD TRADE CENTER TITLE DETAIL OF PLATE GIRDER DATE 5-1-68

REVISIONS

7-19-68



Detail 5



Detail 6

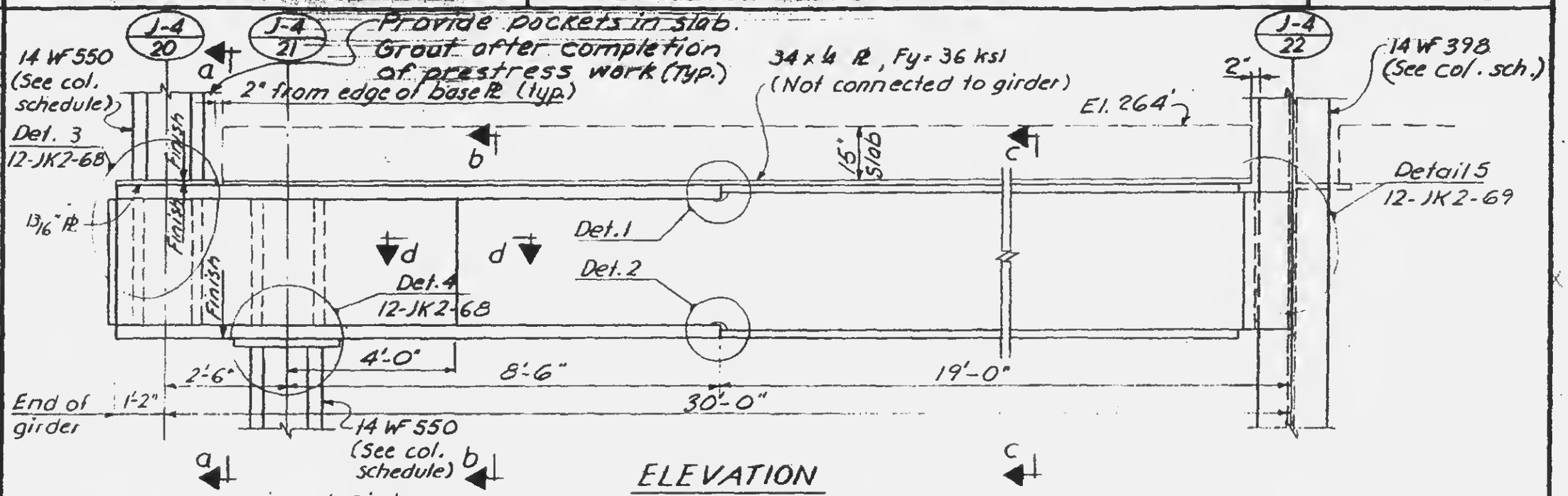
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34260
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-66

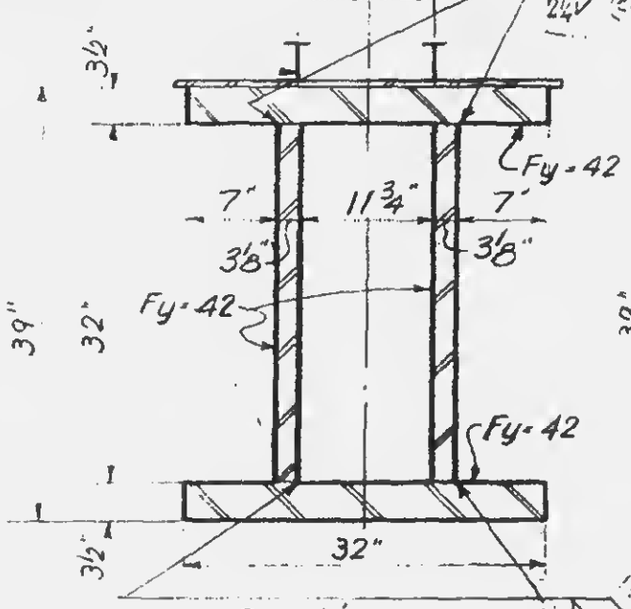
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 5-1-68

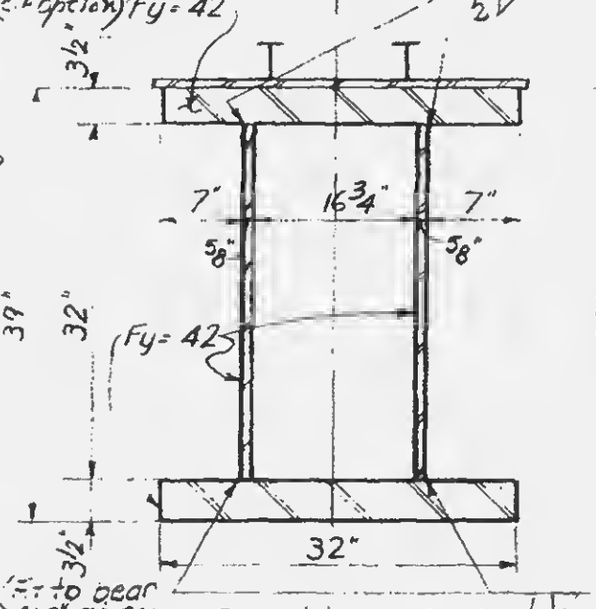
REVISIONS
7-19-68
1-3-69



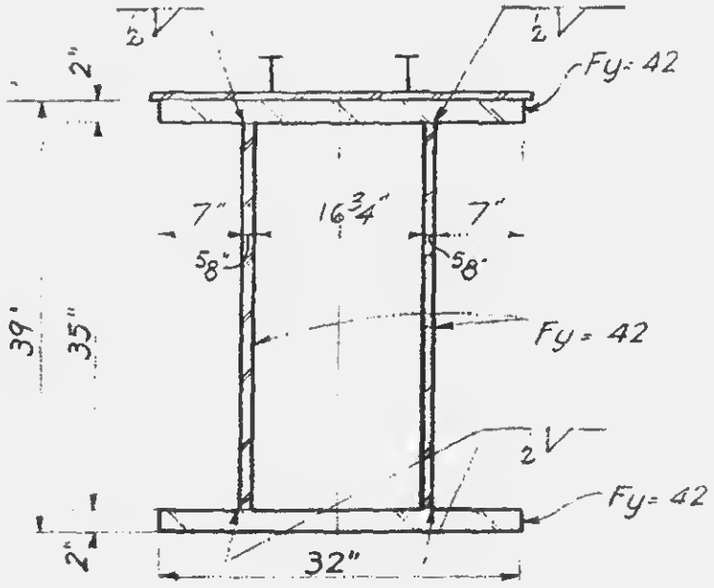
ELEVATION



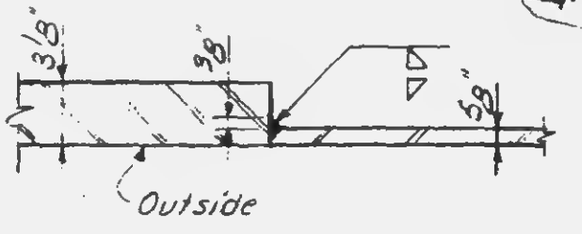
Section a-a



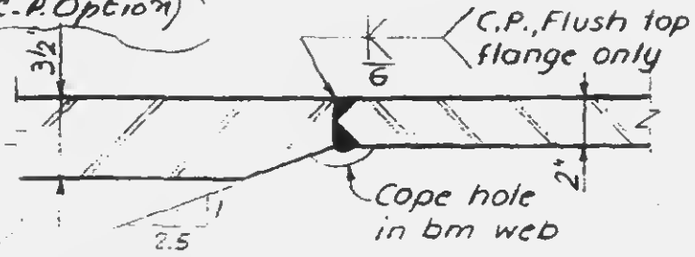
Section b-b



Section c-c



Section d-d



Detail 1 (as shown) - Detail 2 (reflected)

Note:
1. All welds to be E70xx.
2. All bolts to be A 325 friction type. Except as noted.
3. Col. cap Pl Detail similar to Detail 104 (10-JK2-7)

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 54360 — STATE OF NEW YORK

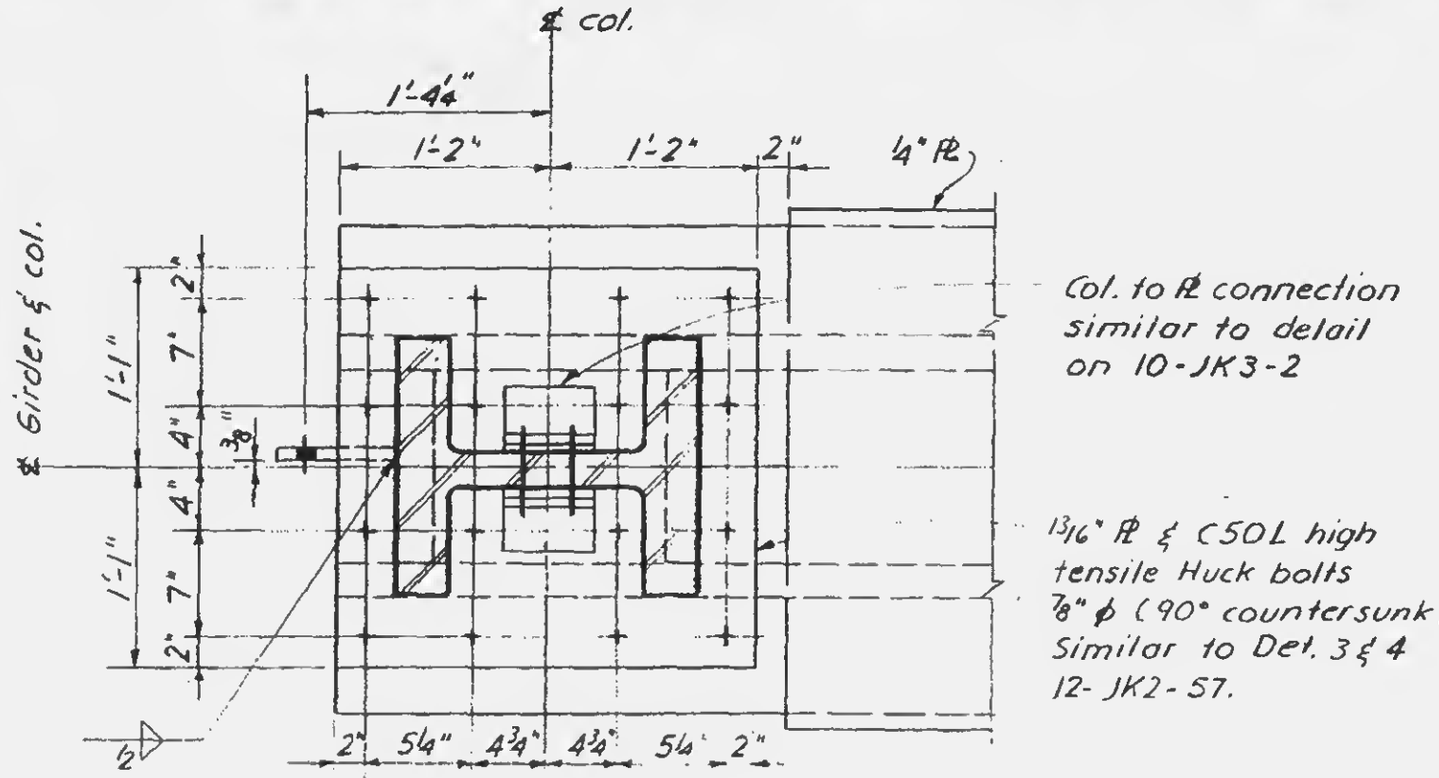
DRAWN S.T.M.
REVIEWED E.L.

12-JK2-67

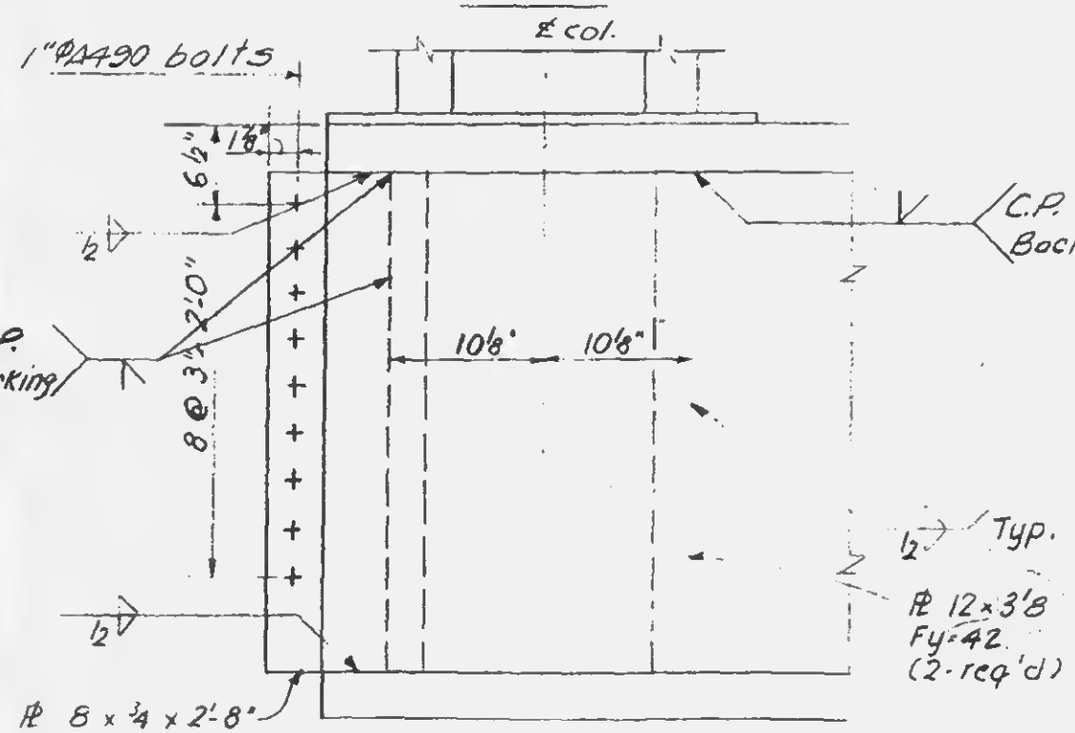
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 5-1-68

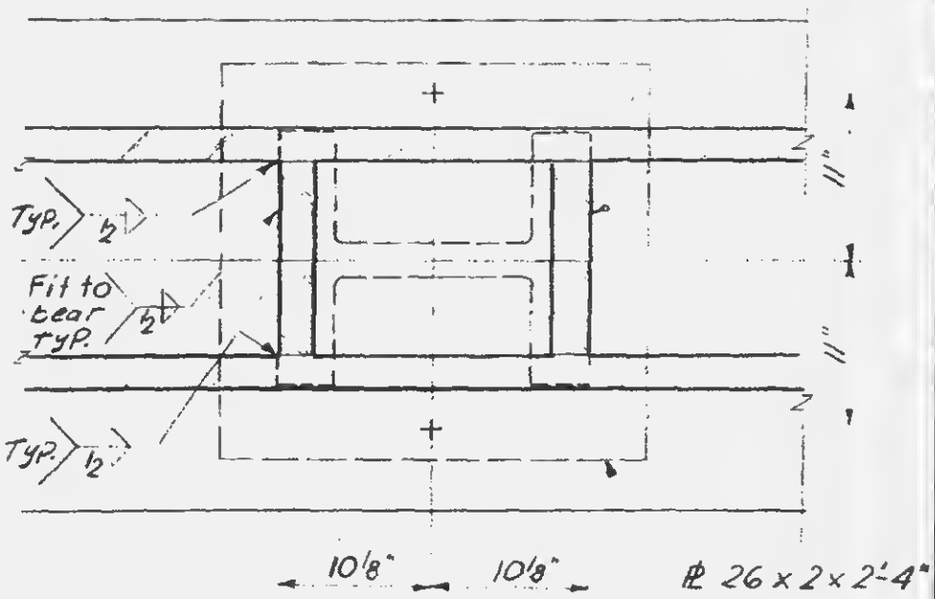
REVISIONS
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7-19-68



Detail 3
Plan



Detail 3
Elevation



Detail 4

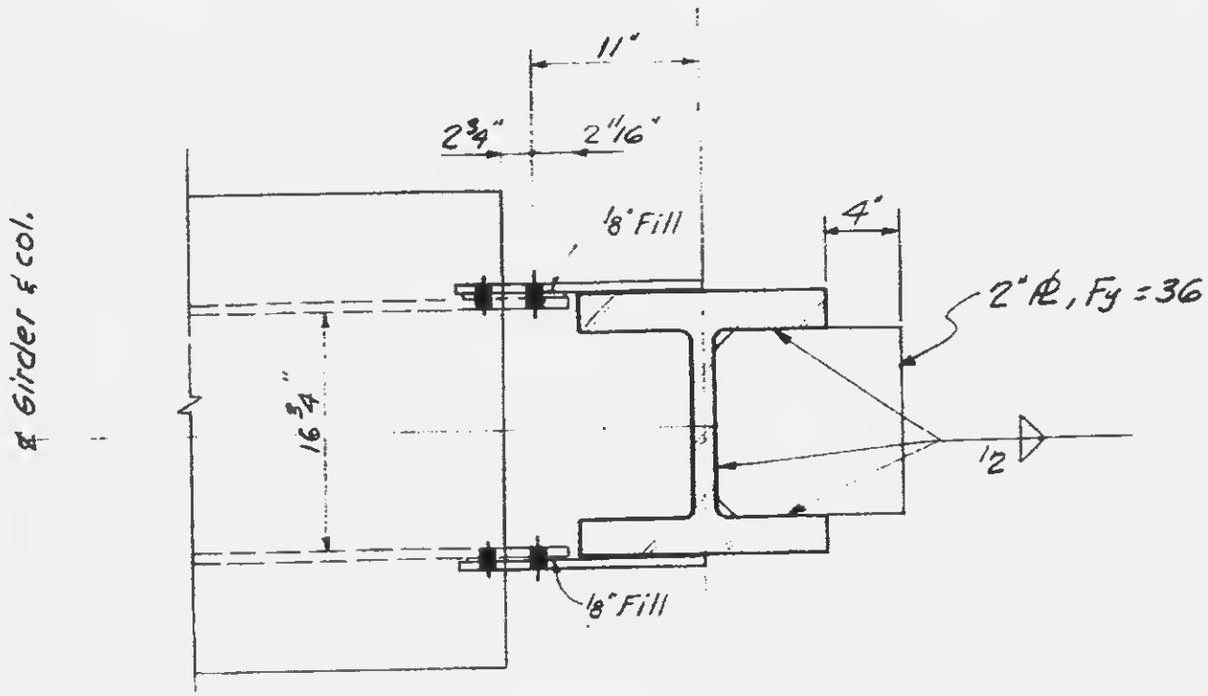
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 24390
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-68

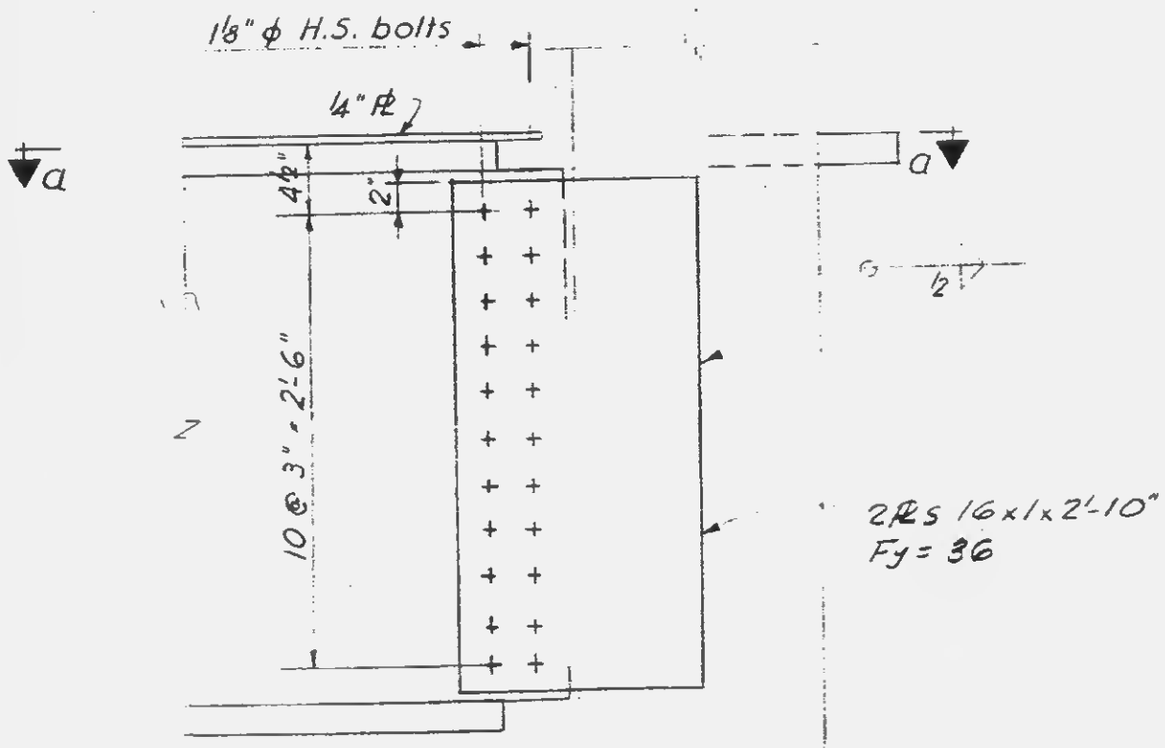
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 5-1-68

REVISIONS



Section a-a



Detail 5

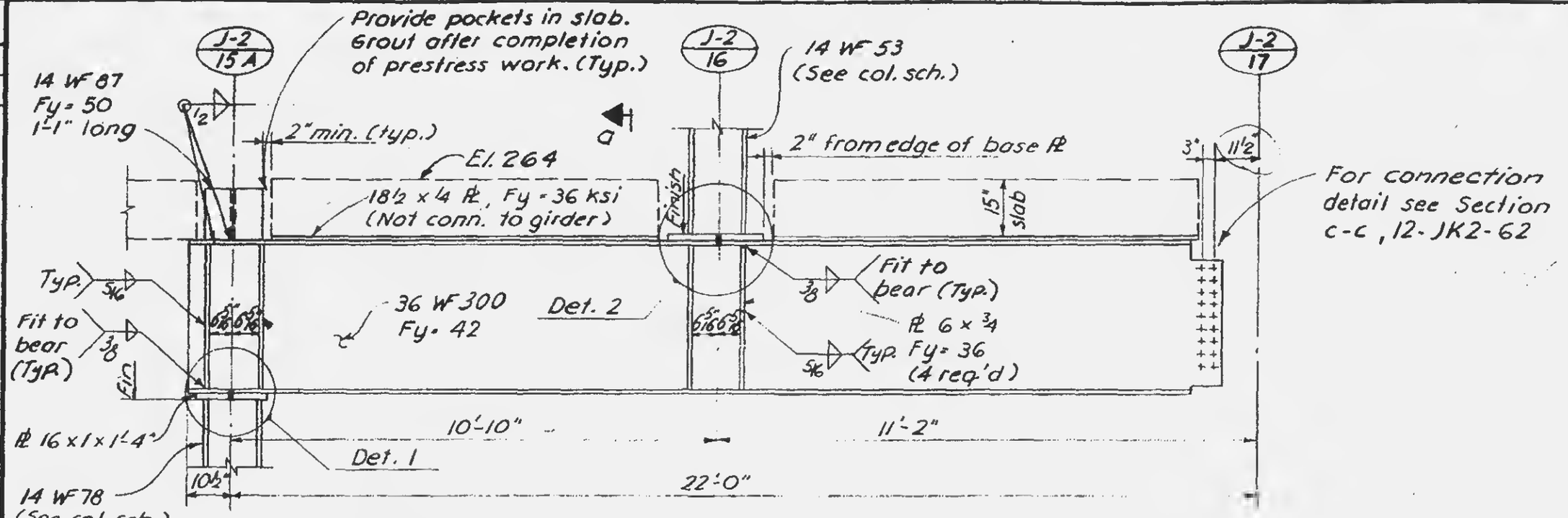
12-JK2-69

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

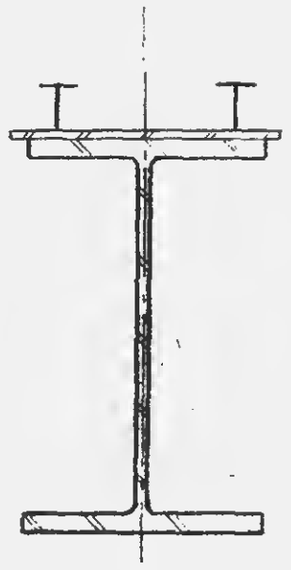
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER DETAILS | DATE 5-1-68

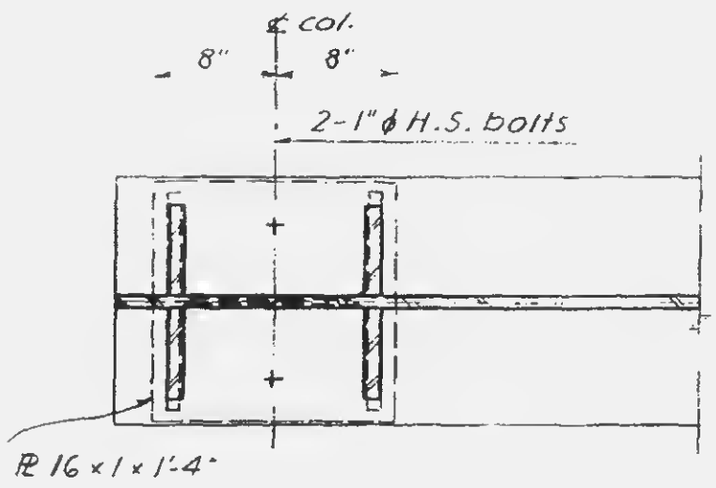
REVISIONS
6-7-68
7-19-68



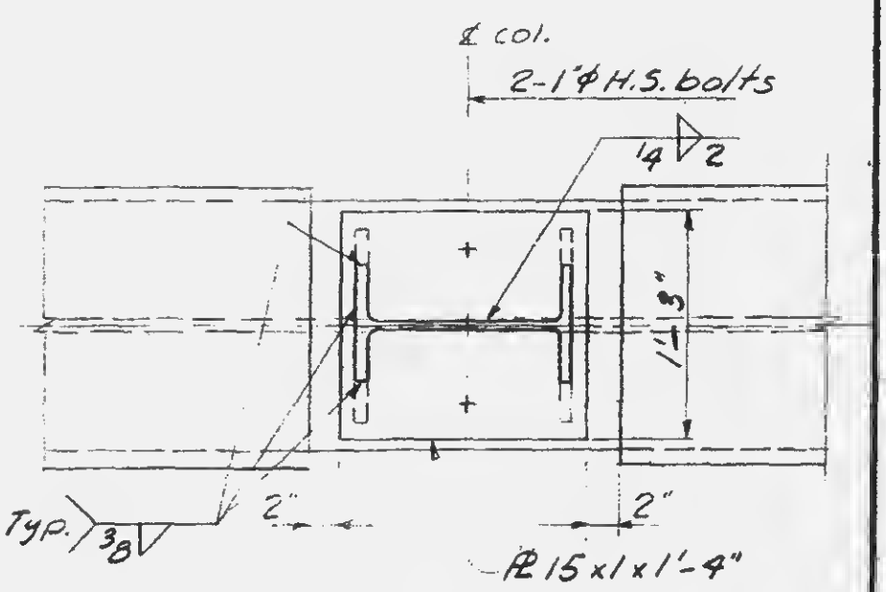
ELEVATION



Section a-a



Detail 1



Detail 2

Note:
1. All welds to be E 70 xx
2. All bolts to be A325 friction type.
3. Col. cap PL Detail similar to Detail 104 (10-JK2-7)

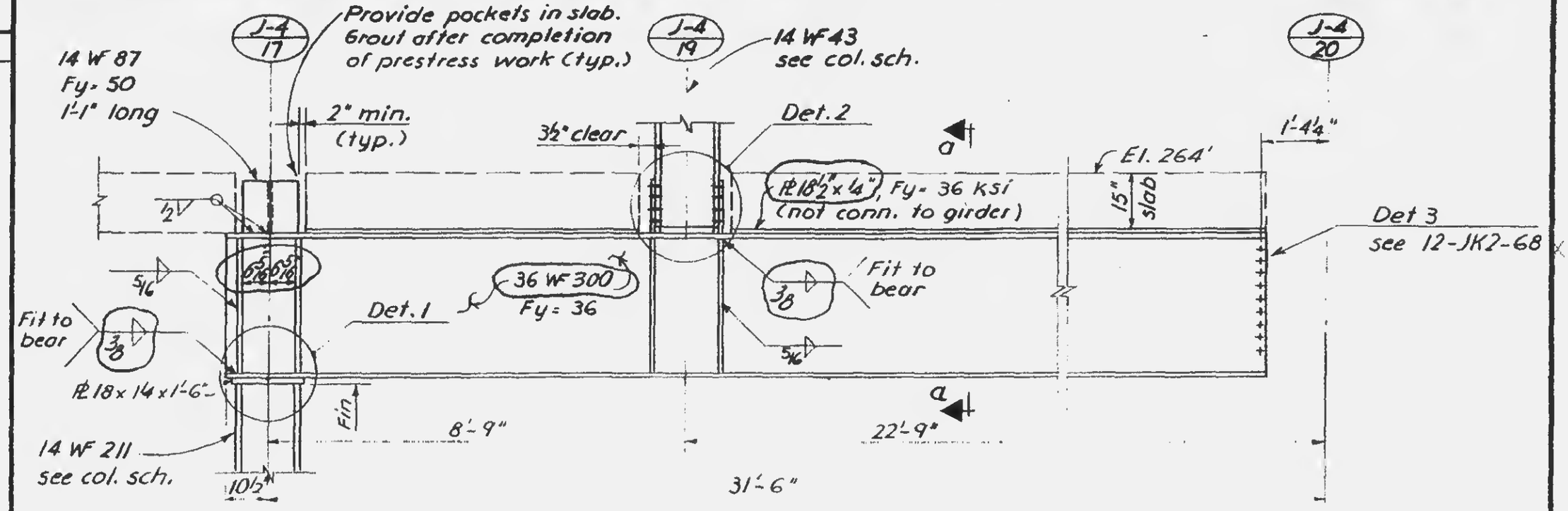
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-70

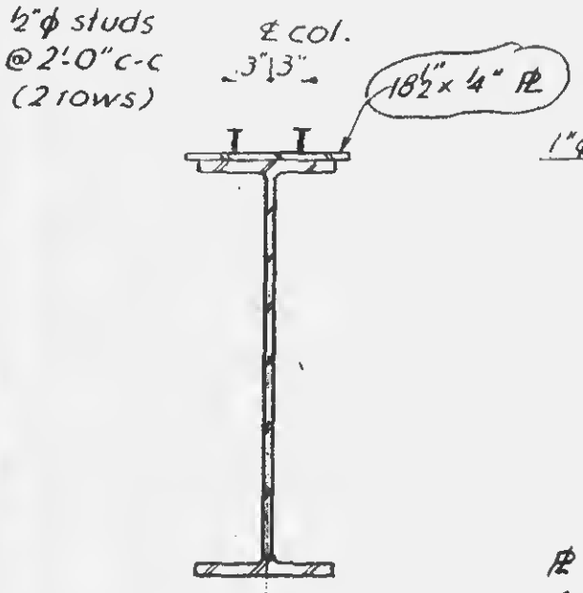
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER DETAILS | DATE 5-1-68

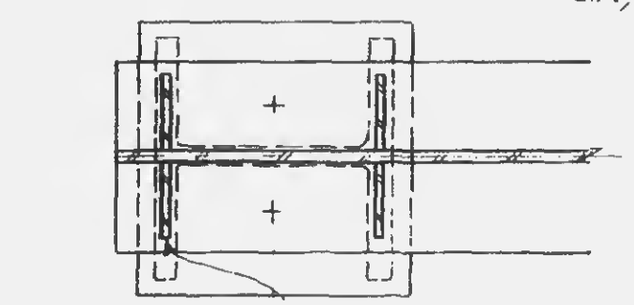
REVISIONS
6-7-68



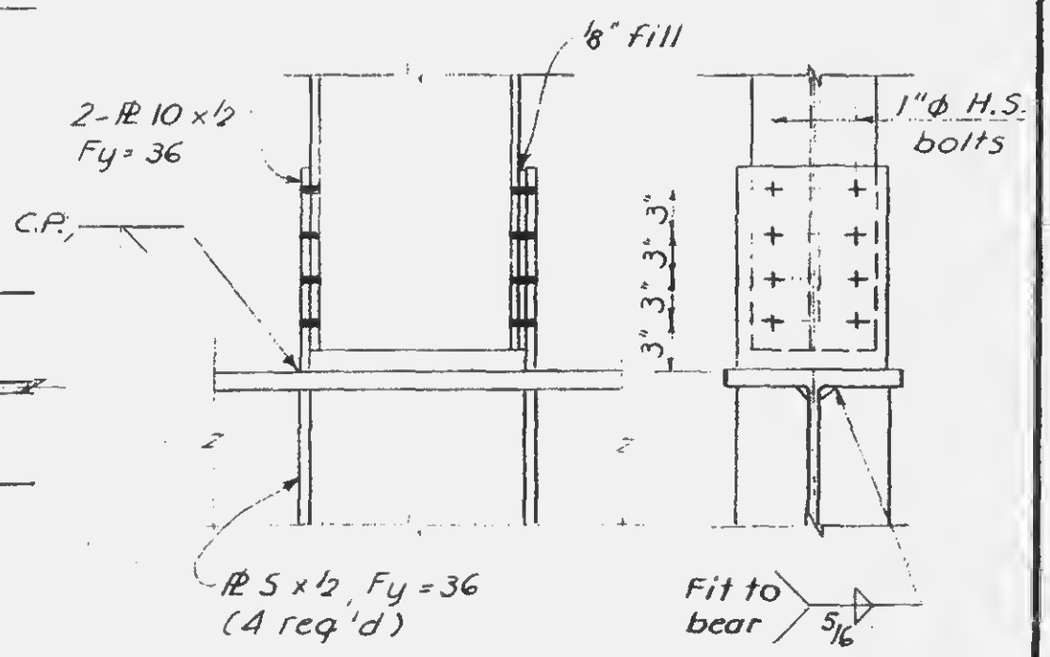
ELEVATION



Section a-a



Detail 1



Detail 2

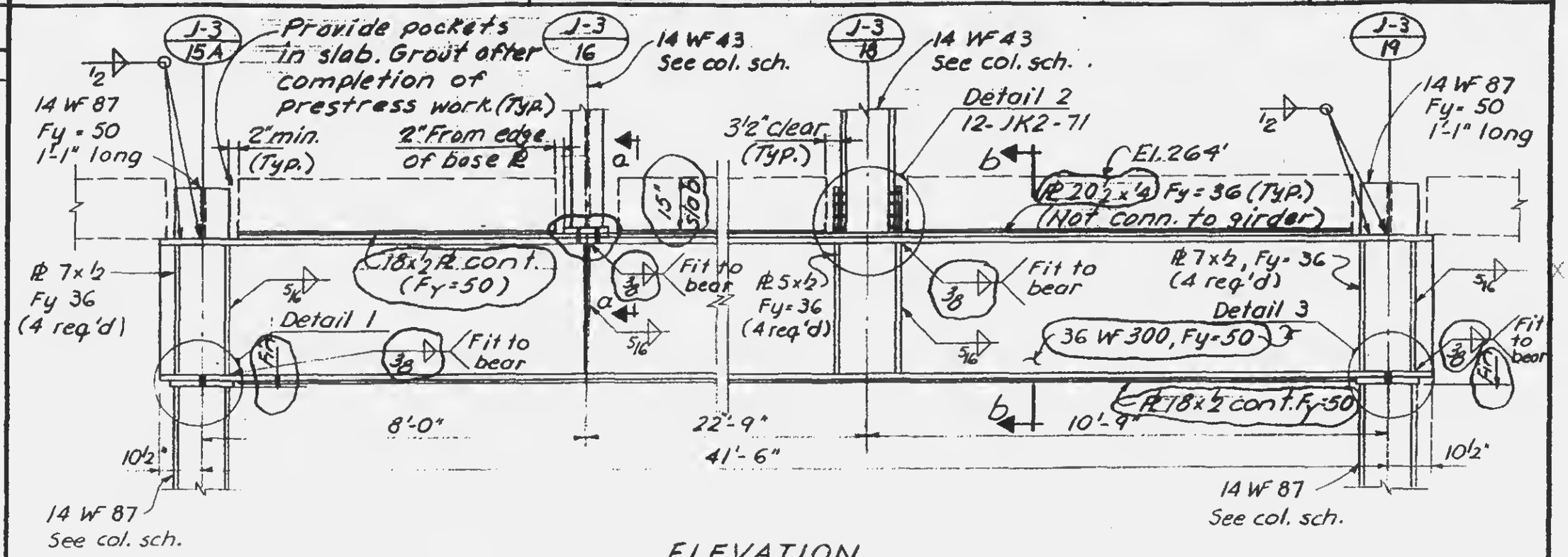
LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON No. 8436 STATE OF NEW YORK UNIVERSITY

12-JK2-71

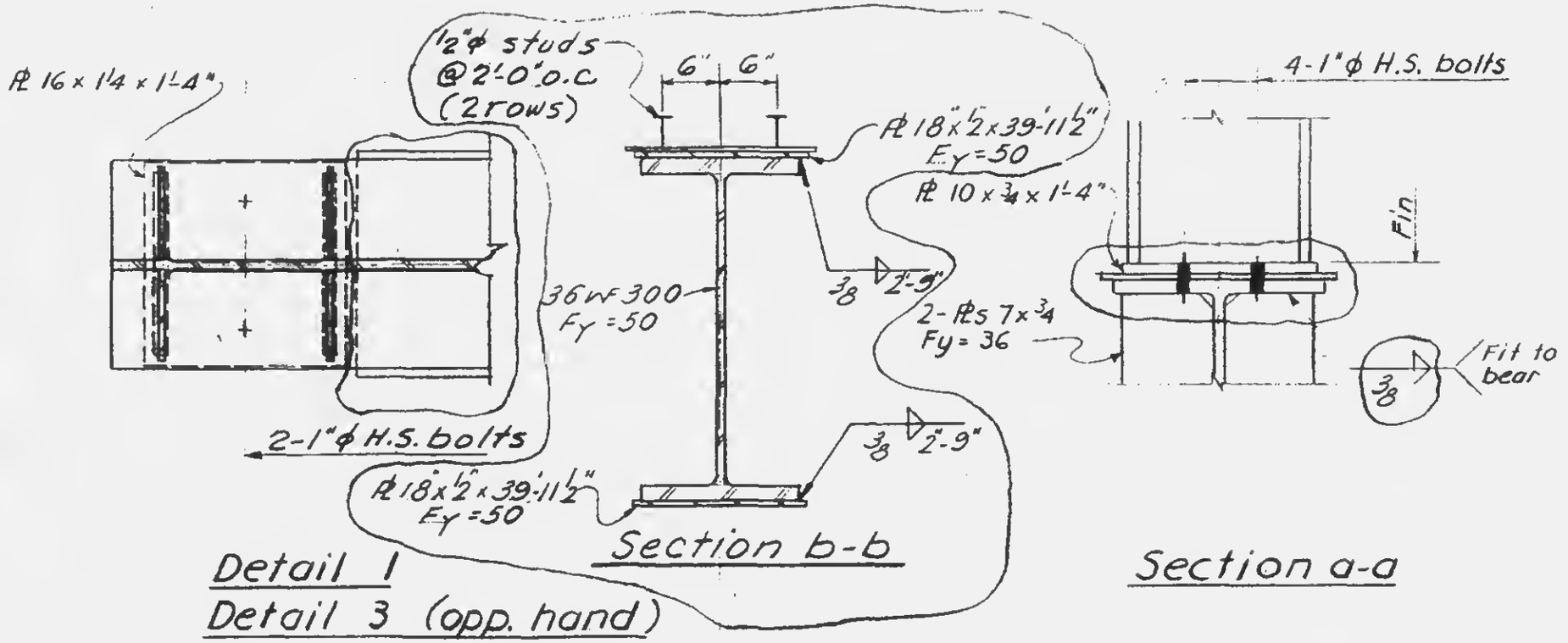
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER DETAILS | DATE 5-1-68

REVISIONS
6-7-68



ELEVATION



Section b-b

Section a-a

Detail 1
Detail 3 (opp. hand)

LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON No. 34360 UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-72

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE TRONCO TRADE CENTER — THIS DRAWING PLATE GIRDER — DATE 5-1-68

REVISIONS
7-19-68
1-3-69

J-5/18 — 10 WF 49, Fy-36 strut, south to col. J74-1

J-5/19 — 14 WF 500 (See col. sch.)

J-5/20

El. 281'-5"
2-1"ϕ H.S. bolts
1" Fill Pl

13/16 Base Pl

Detail 2 12-JK2-74

6" Slab

3/4"ϕ bolts

C.P.

El. 281'-6½"

5/16" Pl, Fy=36

15 x 1½ Pl stiff, Fy=42 (4 req'd)

Detail 1 (sim.)

Fit to bear (Typ.)

5/8

Fin.

Detail 1 12-JK2-74

12-JK2-74 ℄ Beams

Typ. ½

8½" 8½"

9" 9"

15 x 1½ Pl stiff. Fy=42 (4 req'd)

Typ. 5/8

Fit to bear (Typ.) ½

Detail 1 (sim.)

2-1"ϕ H.S. bolts

Pl 23 x 3 x 2'-1" Fy=42

a b c d

11'-0"

19'-9"

22'-9"

8-1⅛" A490 bolts ea. side

2-Pls 12 x ½, Fy=36

7'-0"

15'-0"

Pl 23 x 3½ x 2'-1", Fy=42

14 WF 370 (See col. sch.)

End of girder 1'-0"

37'-9"

1'-0" End of girder

14 WF 61 Hanger (See col. sch.)

14 WF 550 (See col. sch.)

ELEVATION

℄ Girder

Pl 32 x 3 Fy-42

2" Pl Fy-42

Fit to bear 2'-0" at col. J-5/18 (C.P. Option)

Pl 32 x 3, Fy=42

6'-5" 5'-11" 3"

Section a-a

℄ Girder

Pl 32 x 6¾ Fy-42

2" Pl, Fy=42

Fit to bear 2'-0" at col. J-5/19 (C.P. Option)

Pl 32 x 6¾, Fy=42

6'-5" 5'-3½" 6¾"

Section b-b

℄ Girder

¾"ϕ studs @ 2'-0" c.c. at slab (3 rows)

Pl 32 x 3 Fy-42

Fit to bear 2'-0" at col. J-5/20 (C.P. option)

Pl 32 x 3, Fy=42

5'-11" 6'-5" 3"

Section c-c

Note:
1. All welds to be E 70xx
2. All bolts to be A325 friction type except as noted.
3. Col. cap Pl detail sim. to Detail 104 (10-JK2-7)

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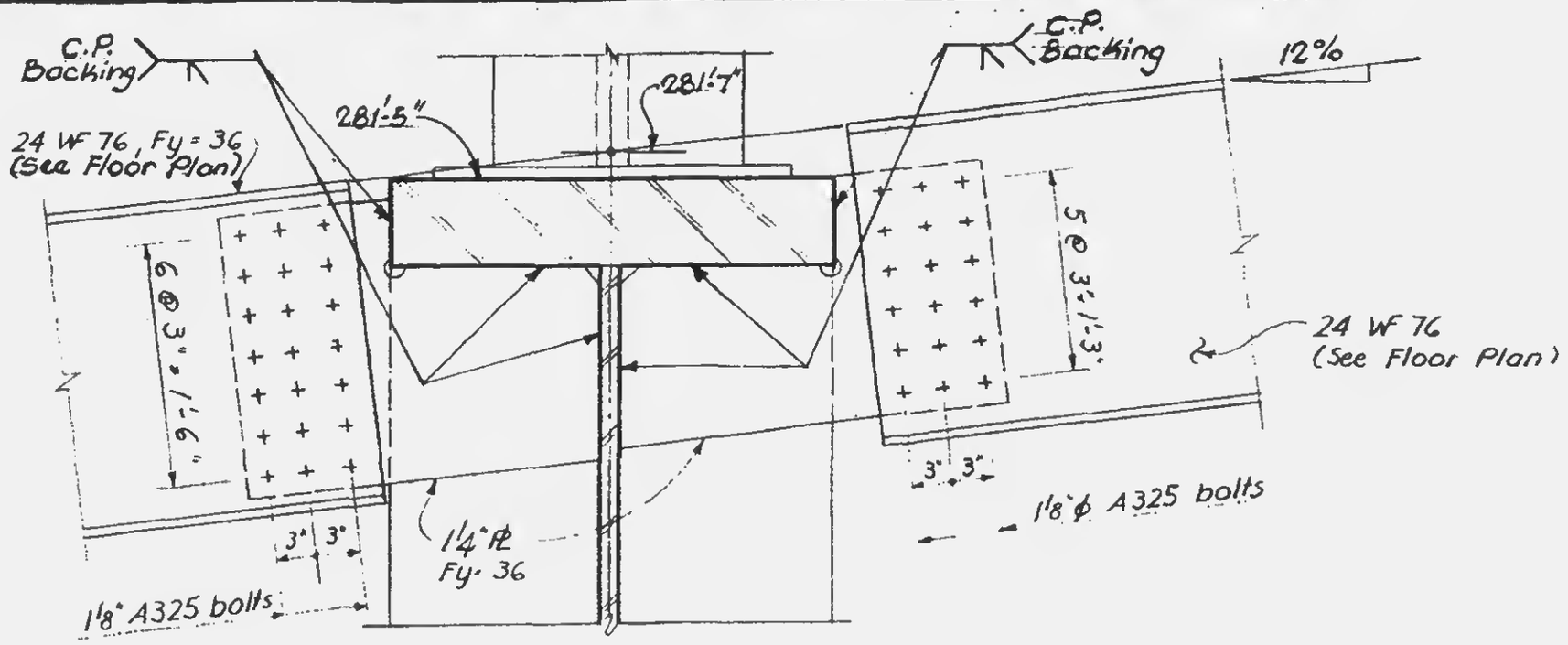
DRAWN S.T.M.
REVIEWED E.L.

12-JK2-73

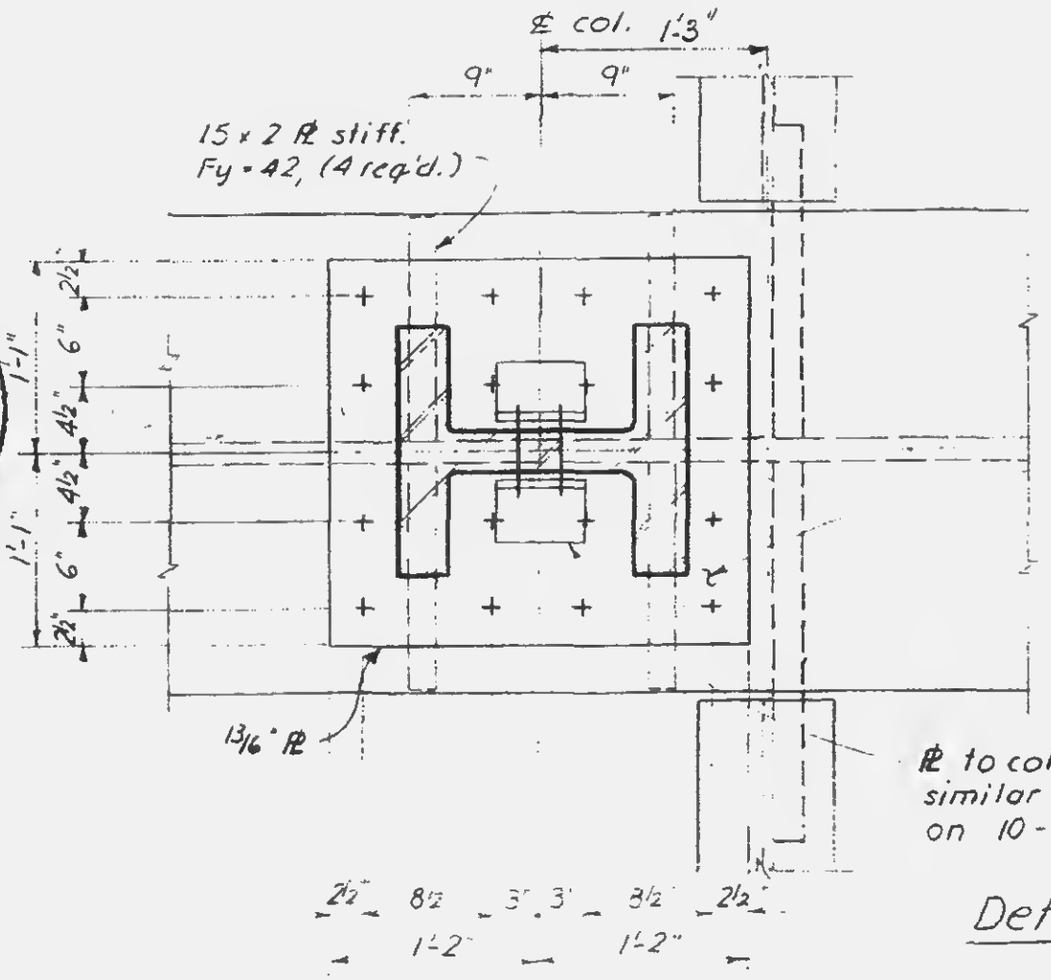
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER TITLE DETAIL OF PLATE GIRDER DATE 5-1-68

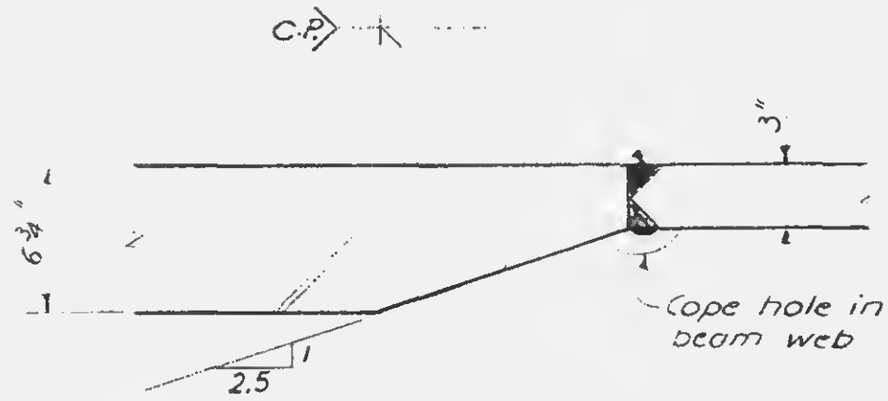
REVISIONS



Section d-d



Detail 2



Detail 1

13/16" PL ℄ C50L high tensile Huck bolts 7/8" ϕ (90° countersunk). Similar to Det. 3 & 4 12-JK2-57.

PL to col. connection similar to detail on 10-JK3-2

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12-JK2-74

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PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 5-1-68

REVISIONS
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7-19-68
1-3-69

J-74/1 | J-6/16 | J-75/1

14 WF 68 (See col. sch.)
1" ϕ H.S. bolts
PL 14 x 1½ x 1'-6"
El. 278'-11"
14 WF 455 (See col. sch.)
℄ Beams
1⅛" ϕ bolts
2¼"
PL 10 x 1¼ stiff., Fy=42 (4 req'd)
Fin.
⅜ Fit to bear (typ)
⅜ Typ.
7½" 7½"
Detail 1 / 12-JK2-76
Fit to bear Typ
½
Detail 2 / 12-JK2-76
Typ. ½
9½" 9½"
12-JK2-76
Typ. ½
½" PL, Fy=36
C.P.
El. 277'-10¼
El. 274'
1" ϕ holes @ 1'-0" c.c. for rebar
El. 273'-10½"
11" slab
Detail 1 (Reflected)
Fit to bear (typ) ½
Detail 3 / 12-JK2-76
Fit to bear (typ)
PL 25 x 3¼ x 2'-1" F_y=42
13'-0"
16'-8"
12-JK2-76A
23'-2" (Verify)
6'-6" (Verify)
14 WF 398 (See col. sch.)
End of girder
14 WF 314 (See col. sch.)
1'-4"
29'-8" (Verify)

a b c d e f

ELEVATION

℄ Girder
PL 32 x 1½" Fy=42 T ℄ B
1½"
⅜ Fit to bear 2'-0" at col. J-74/1 (c.p. option)
2⅛" PL Fy=42
6'-8"
6'-5"
⅜ Fit to bear 2'-0" at col. J-74/1 (c.p. option)
1½"
2'-8"

Section a-a

℄ Girder
PL 32 x 2¾" Fy=42 T ℄ B
2¾"
⅞ ⅞
2⅛" PL Fy=42
6'-8"
6'-2½"
⅞ ⅞
2¾"
2'-8"

Section b-b

½" ϕ studs @ 2'-0" c.c. 3 rows
℄ Girder
PL 32 x 2¾", Fy=42 T ℄ B
2¾"
⅞ Fit to bear 2'-0" at col. J-75/1 (c.p. option)
2⅛" PL Fy=42
6'-8"
6'-2½"
⅞ ⅞ Fit to bear 2'-0" at col. J-75/1 (c.p. option)
2¾"
2'-8"

Section c-c

Note:
1. All welds to be E 70xx
2. All bolts to be A 325 friction type.
3. Col. cap PL det. sim. to Det. 104 (10-JK2-7)

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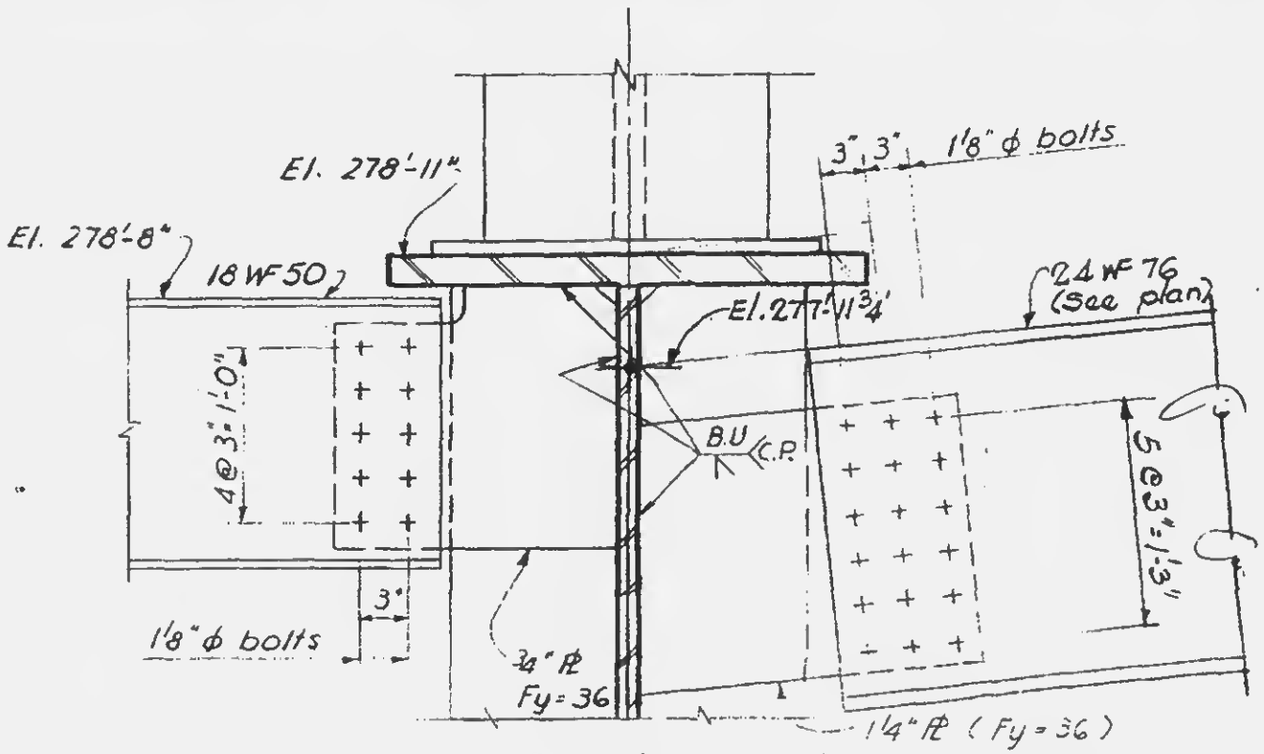
DRAWN S.T.M.
REVIEWED E.L.

12-JK2-75

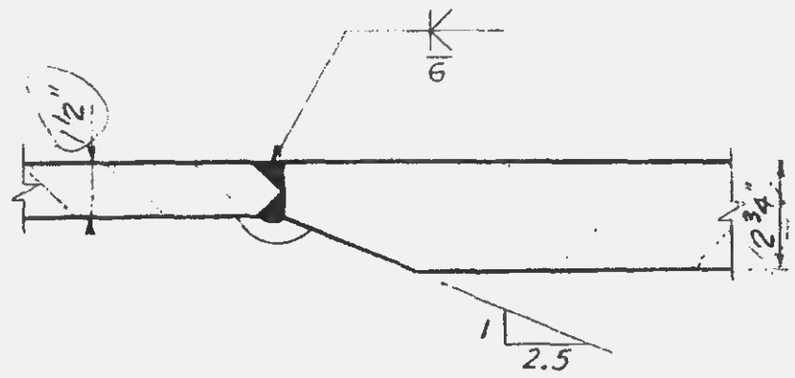
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PROJECT THE WORLD TRADE CENTER TITLE DETAIL OF PLATE GIRDER DATE 5-1-68

REVISIONS
6-7-68
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Section d-d



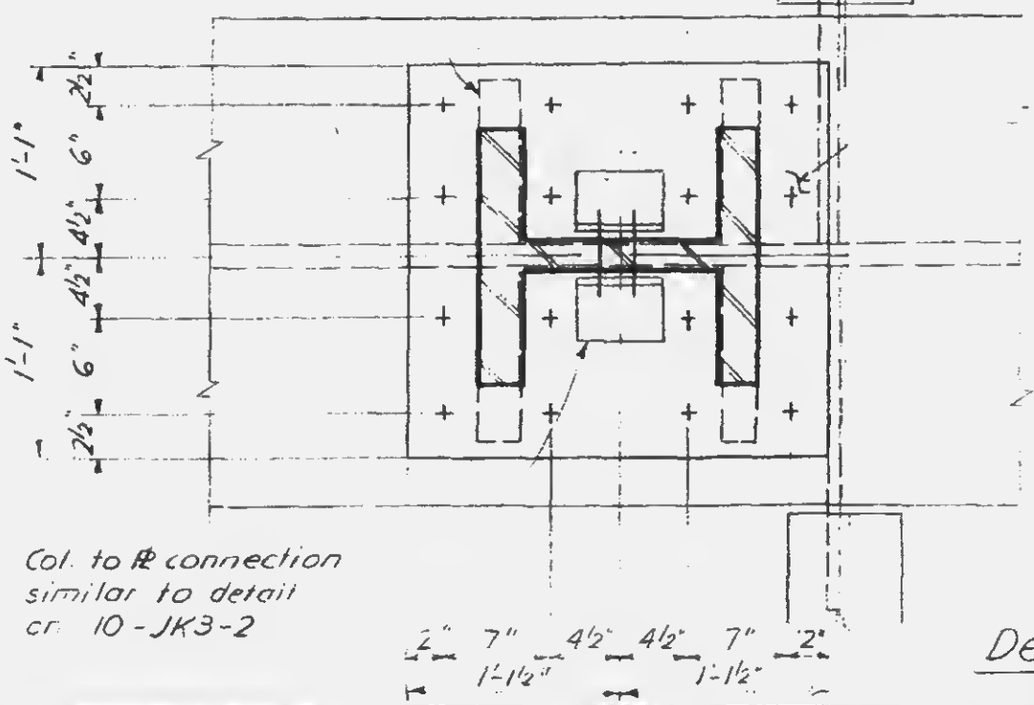
Detail 1

℄ col. — 1'-3" — 9½" — 9½"

11 x 3 PL stiff. Fy = 42 (4 req'd)

13/16" ϕ ℄ C SOL high tensile Huckbolts 7/8" ϕ (90° countersunk). Similar to Det. 3 & 4 12-JK2-57.

12 x 2½ PL stiff. Fy = 42 (4 req'd)



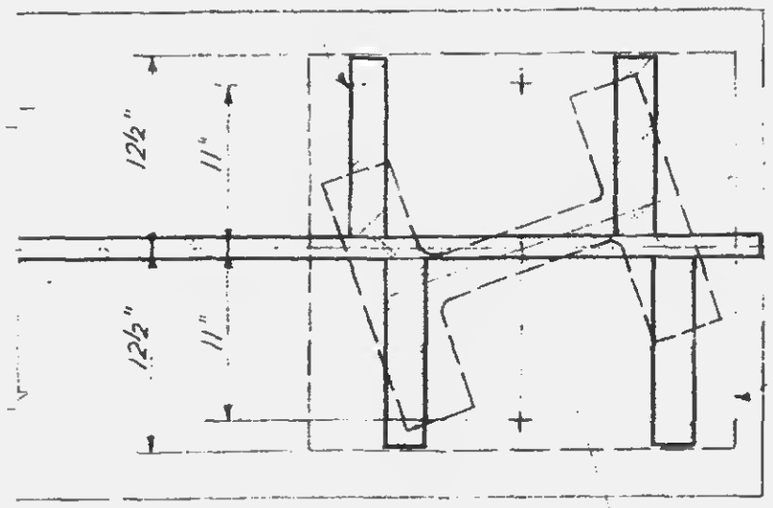
Col. to PL connection similar to detail on 10-JK3-2

Detail 2

℄ col.

8¾ — 7¼

1" ϕ H.S. bolts



PL 25 x 3½ x 2'-2" Fy = 42

7¼ — 8¾

Detail 3

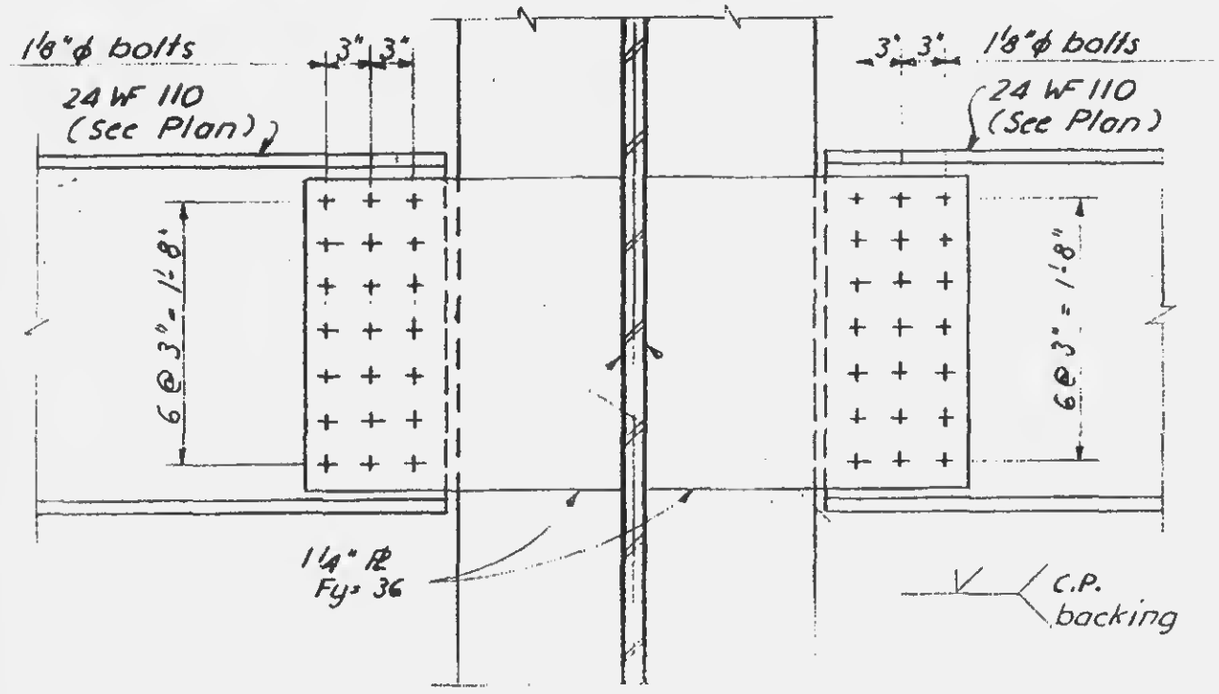
12-JK2-76

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PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 5-1-68

REVISIONS



Section f-f

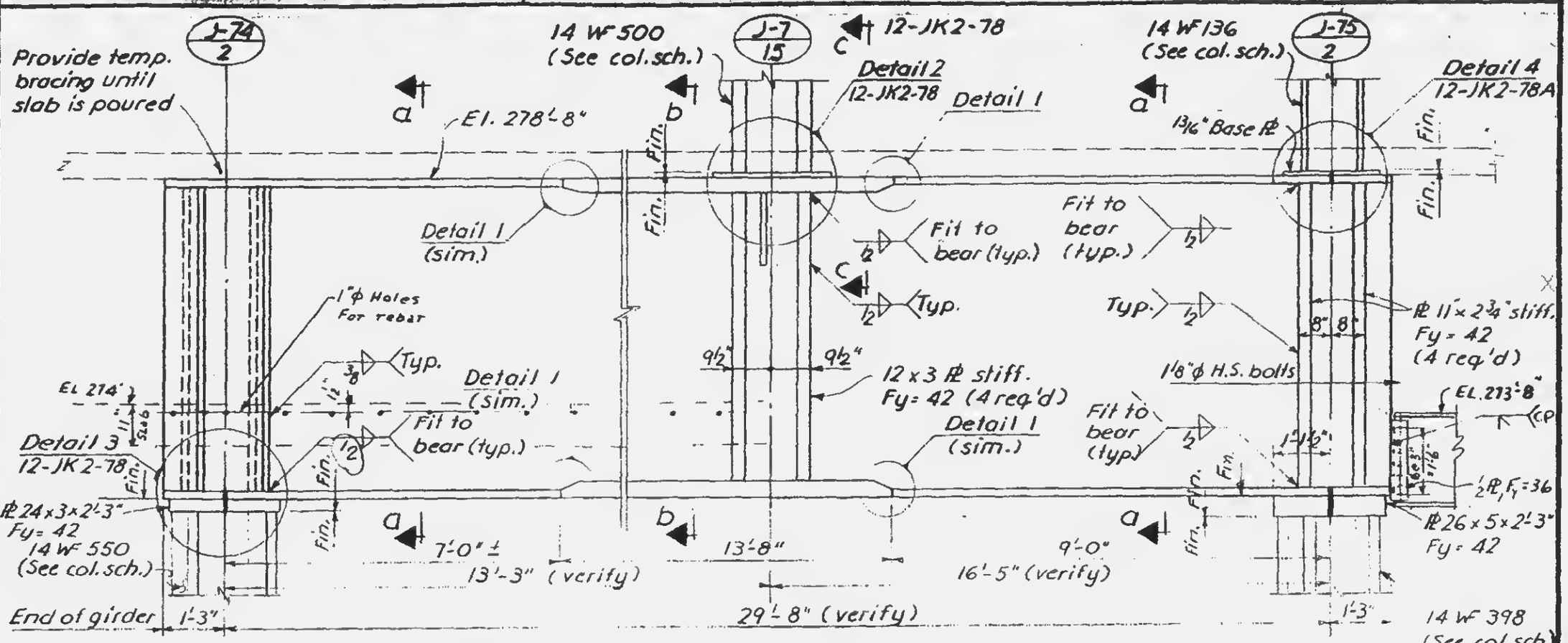


12-JK2-76A

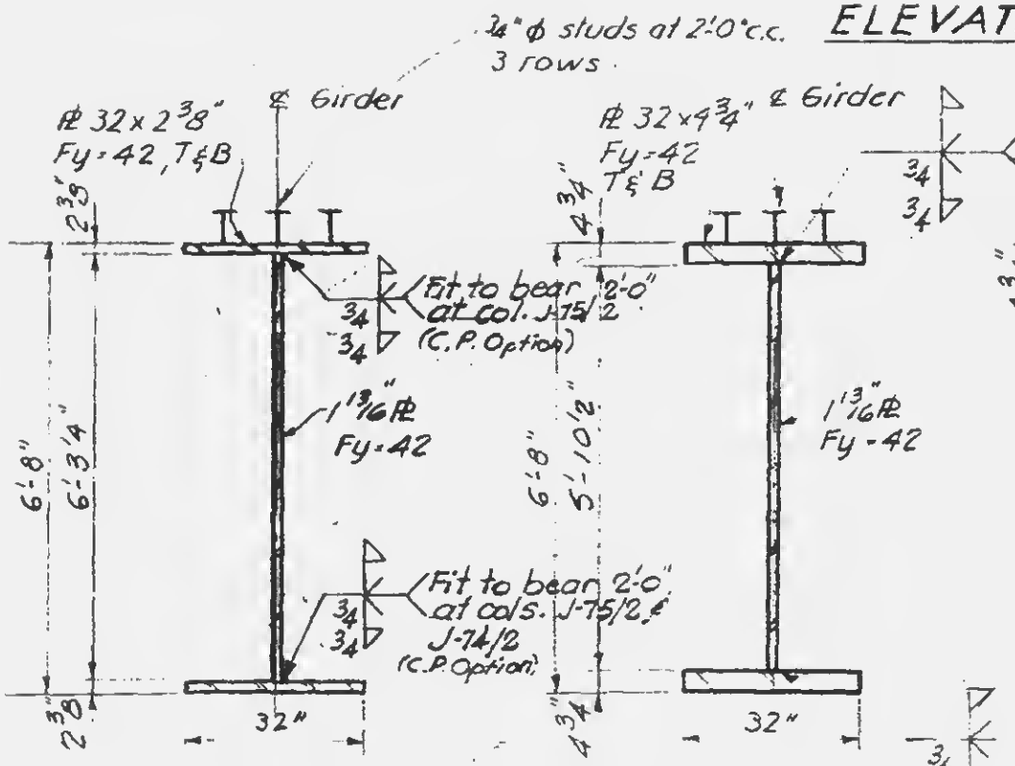
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PROJECT: [illegible] — TITLE: DETAIL OF [illegible] — PAGE: 5-1-68

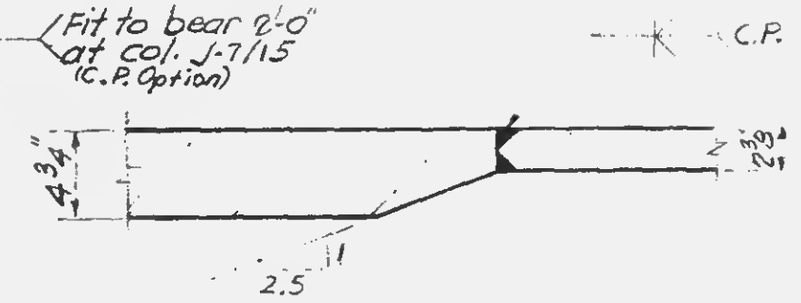
REVISIONS
6-7-68
7-19-68
1-6-69



ELEVATION



Section a-a Section b-b



Detail 1

Note:
1. All welds to be E70xx.
2. All bolts to be A325 friction type except as noted.
3. Col. cap Pl Detail similar to Detail 104 (10-JK2-7).

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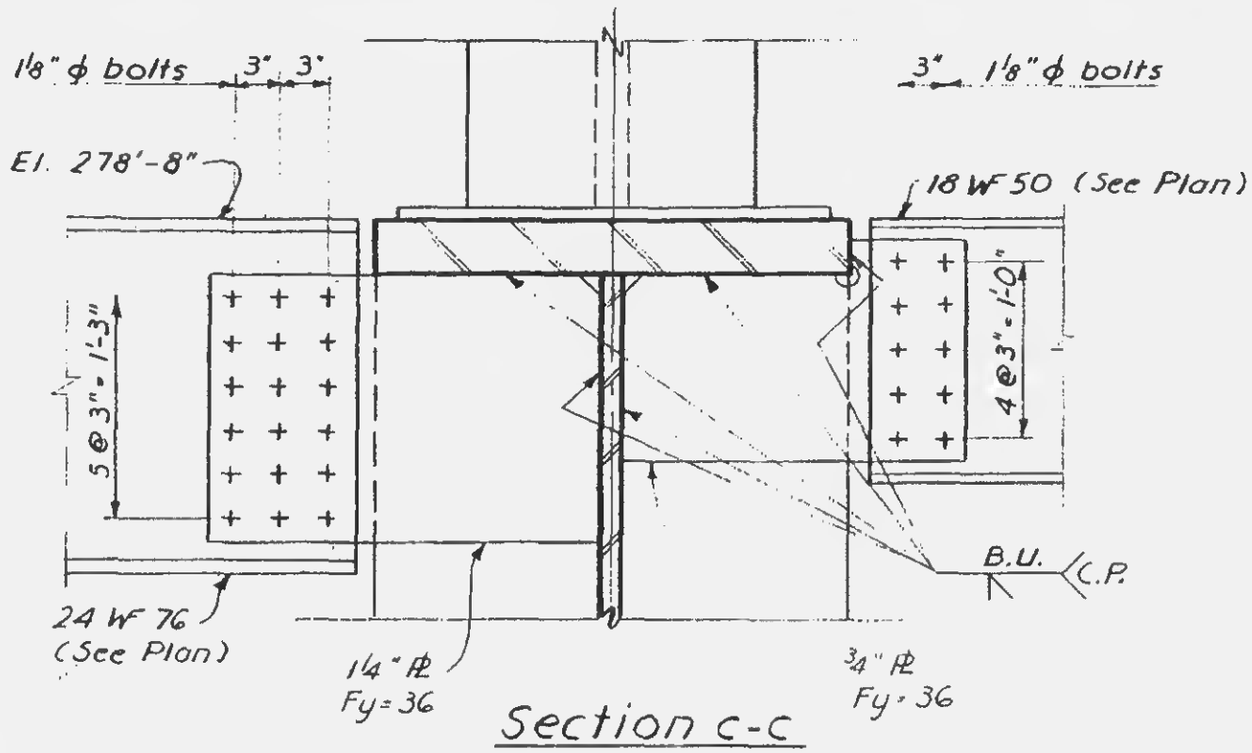
DRAWN S.T.M.
REVIEWED E.L.

12-JK2-77

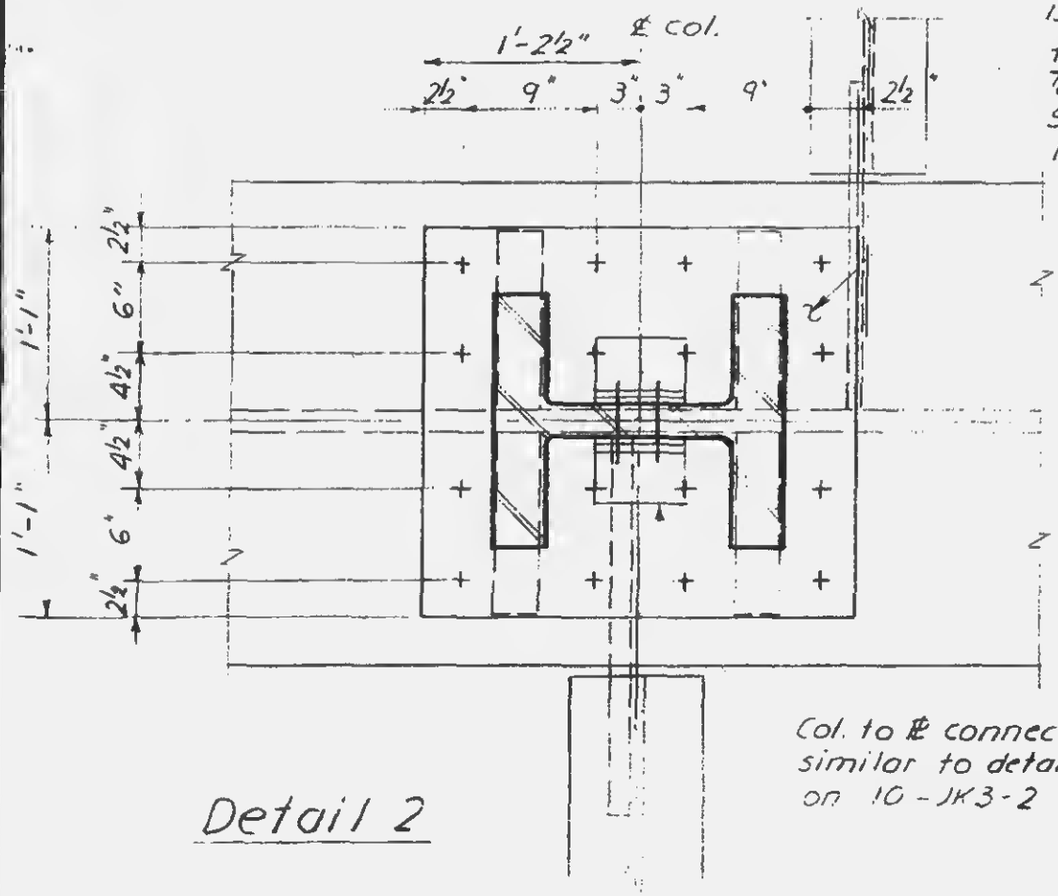
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 5-1-68

REVISIONS



Section c-c



Detail 2

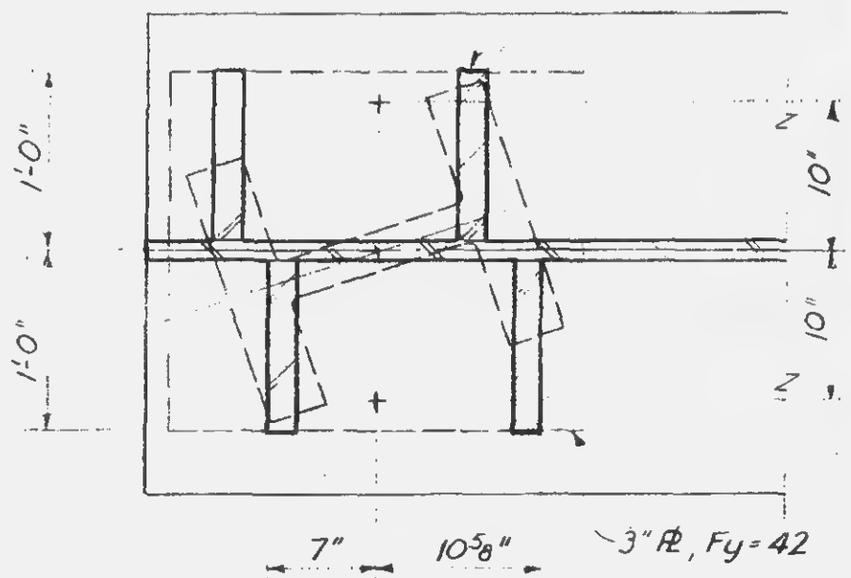
13/16" Ø ϕ C50L high tensile Huck bolts 7/8" ϕ (90° countersunk). Similar to Det. 3 & 4 12-JK2-57.

Col. to Pl connection similar to detail on 10-JK3-2

℄ col.

1'-1½" 1'-1½"
10⅝" 7"

1½ x 1¾ Pl stiff. Fy = 42 (4 req'd)



Detail 3

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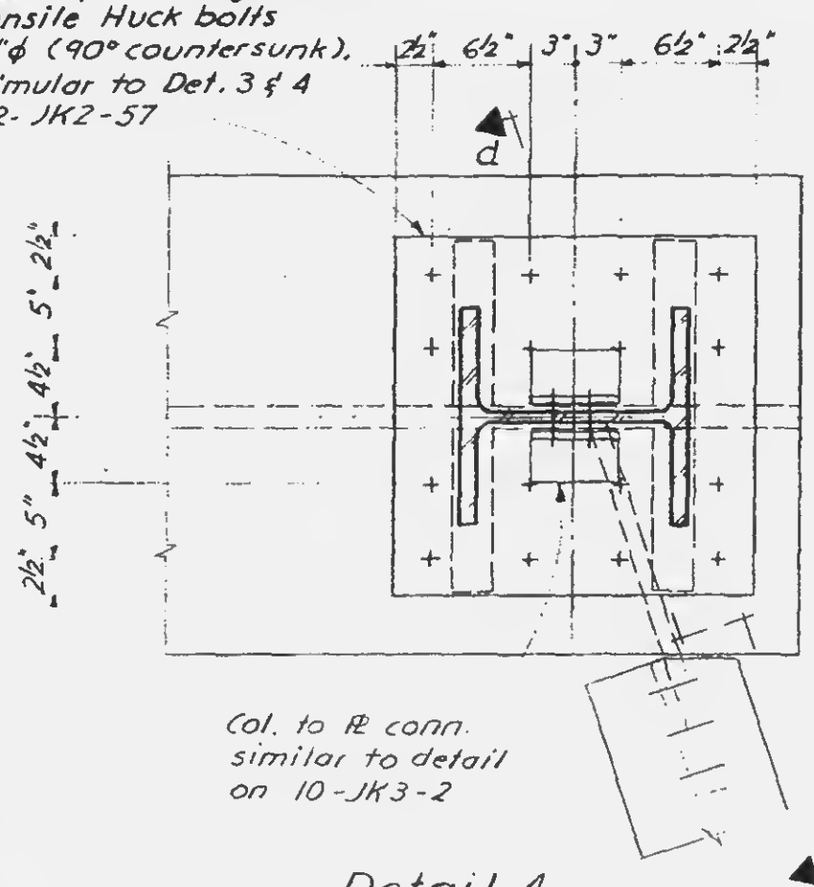
12-JK2-78

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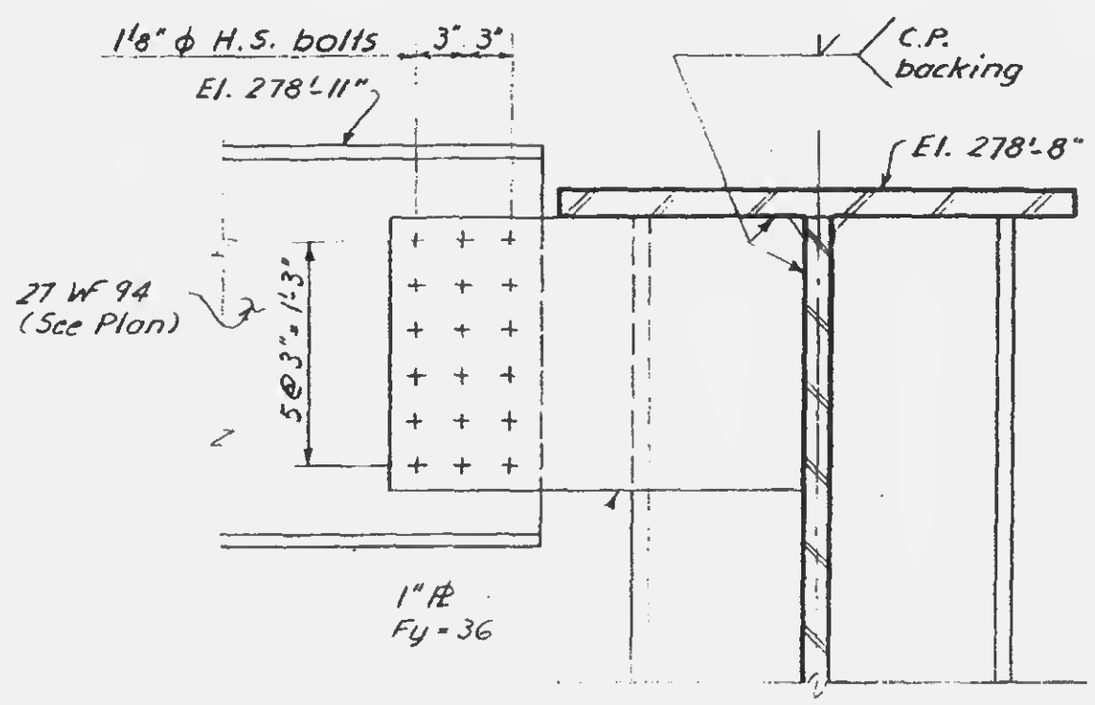
PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 5-1-68

REVISIONS

13/16" ⌀ ℄ C50L high tensile Huck bolts 7/8" ϕ (90° countersunk), Simular to Det. 3 & 4 12-JK2-57



Detail 4



Section d-d

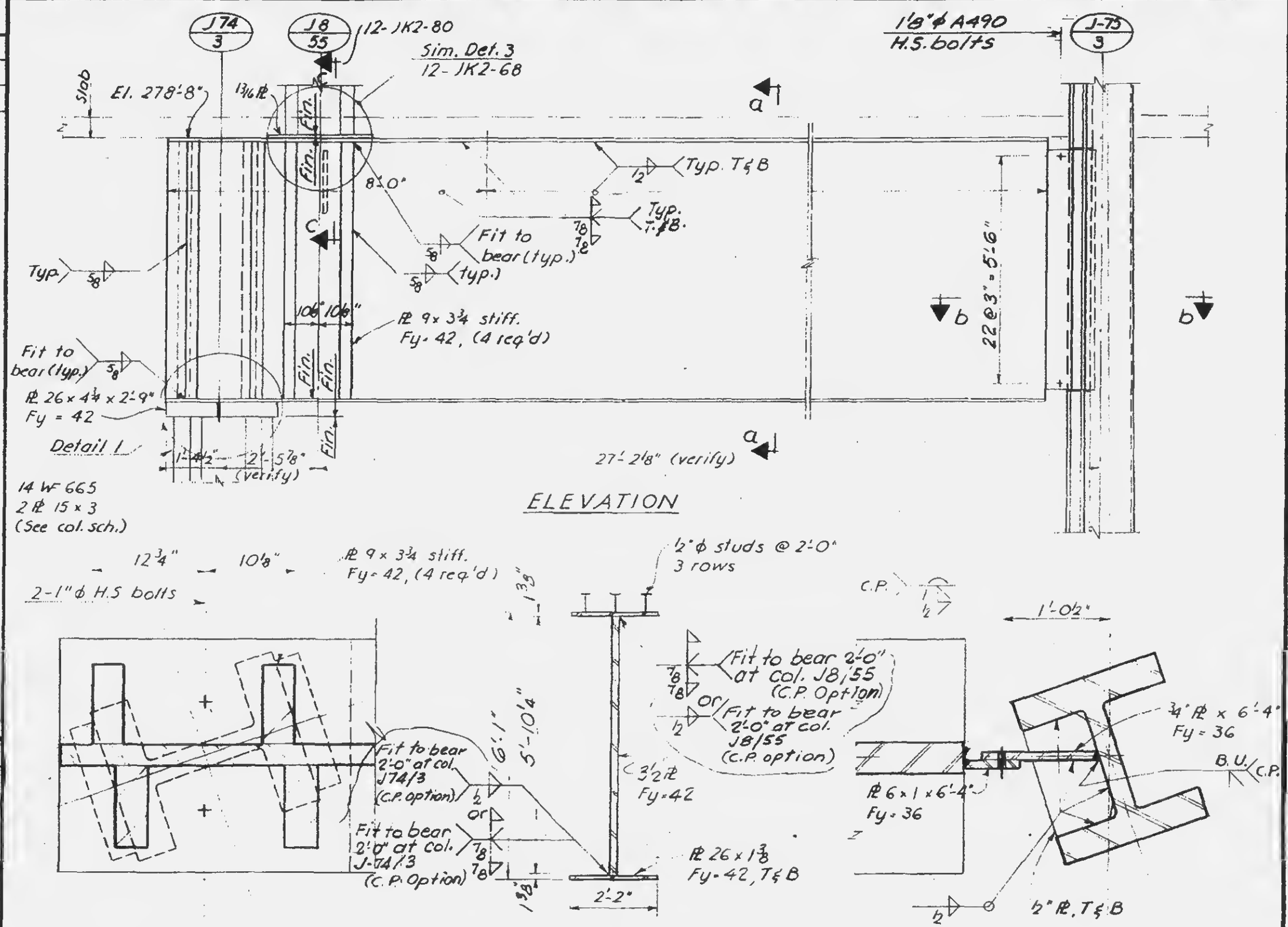
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12-JK2-78A

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PROJECT THE WORLD TRADE CENTER TITLE DETAIL OF PLATE GIRDER DATE 5-1-68

REVISIONS
7-19-68
10-15-68
1-6-69



Note:
1. All welds to be E 70 xx.
2. All bolts to be A 325 friction type, unless noted
3. Col. cap PL Detail similar to Detail 104 (10-JK2-7)

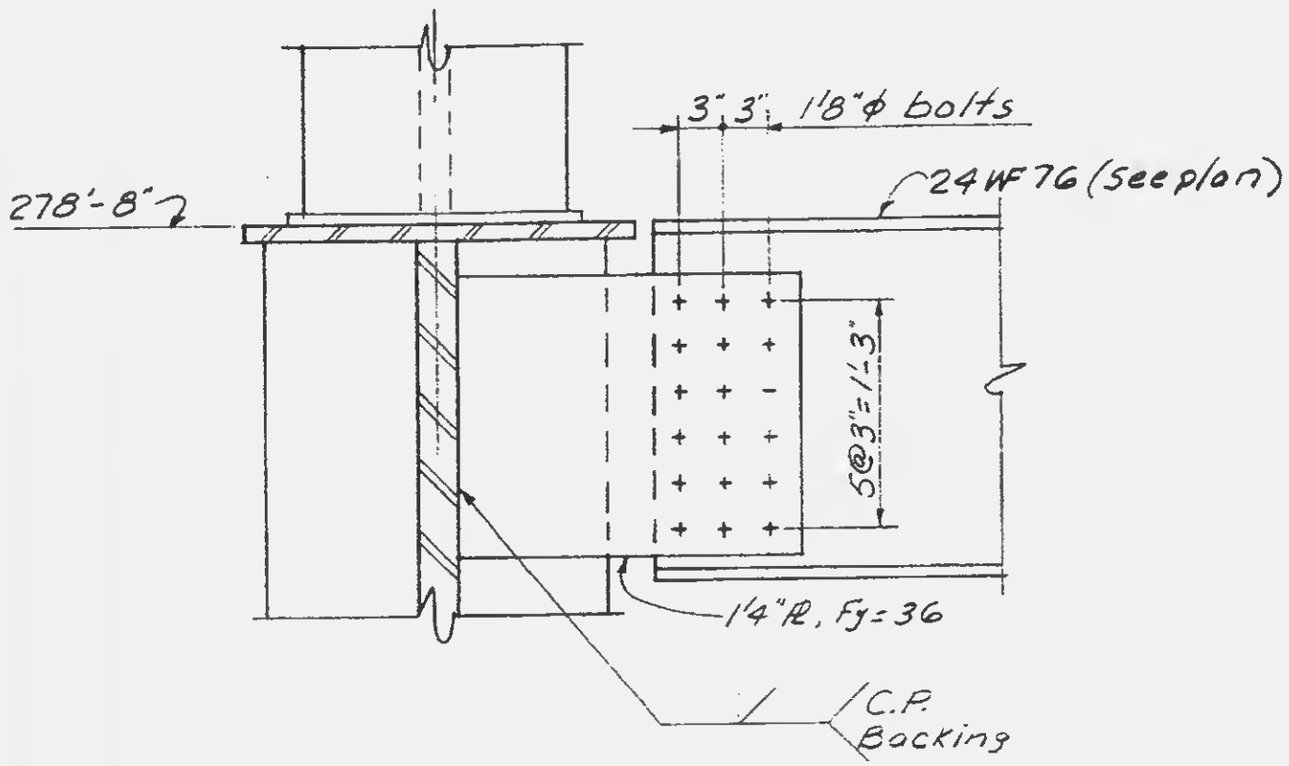
DRAWN S.T.K.
REVIEWED E.L.

12-JK2-79

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PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 5-1-68

REVISIONS



Section c-c

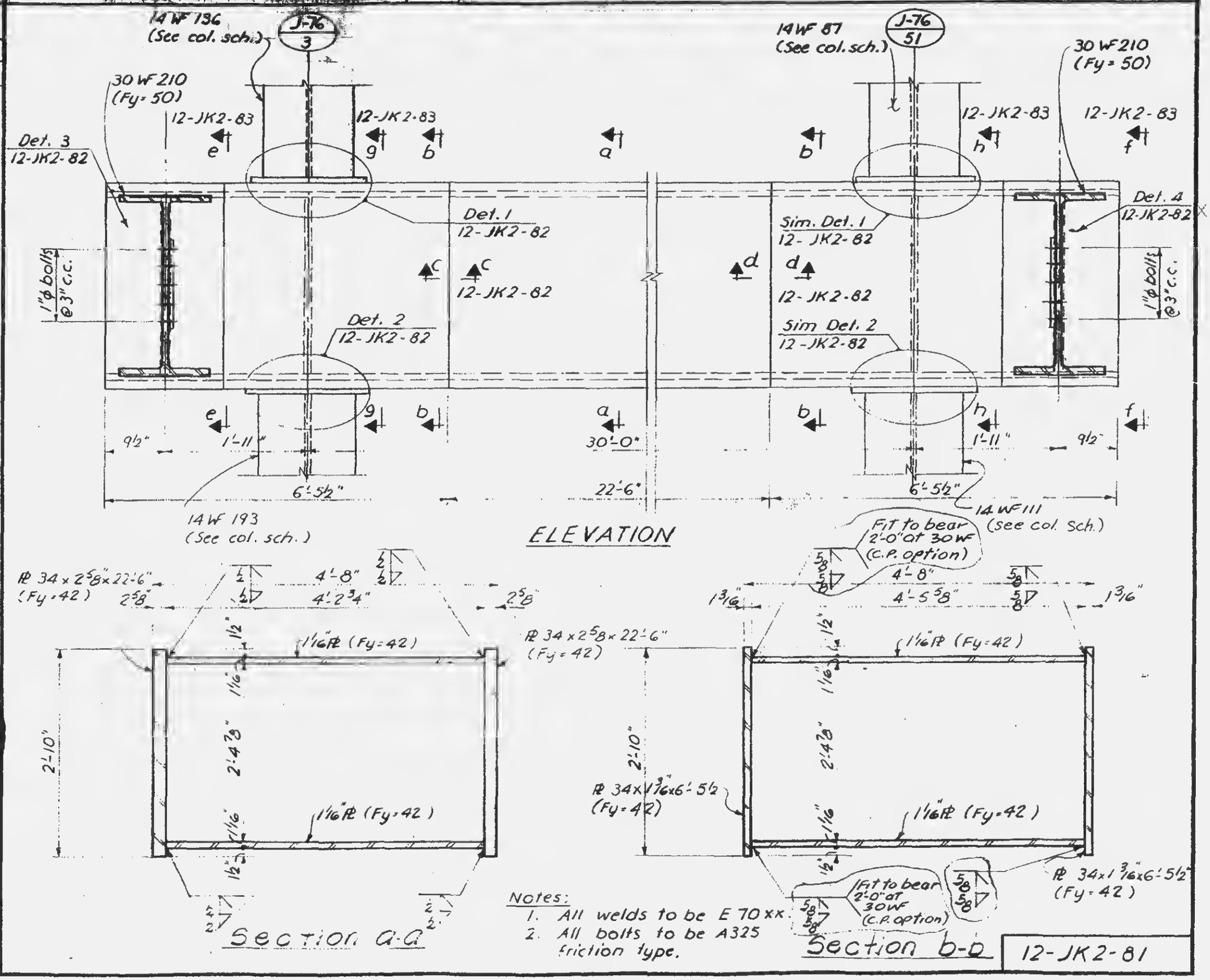
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12-JK2-80

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PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF WIDE FLANGE GIRDER | DATE: 6-7-68

REVISIONS
7-19-68
1-6-69



Notes:
1. All welds to be E 70 xx.
2. All bolts to be A325 friction type.

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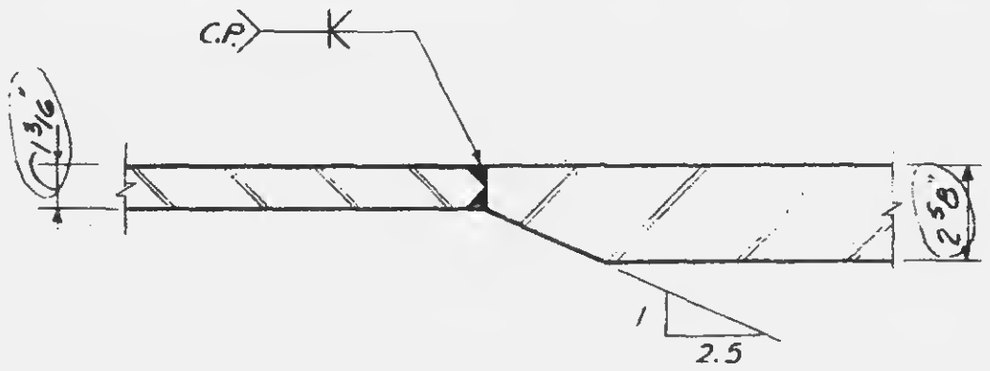
DRAWN S.T.M.
REVIEWED E.L.

12-JK2-81

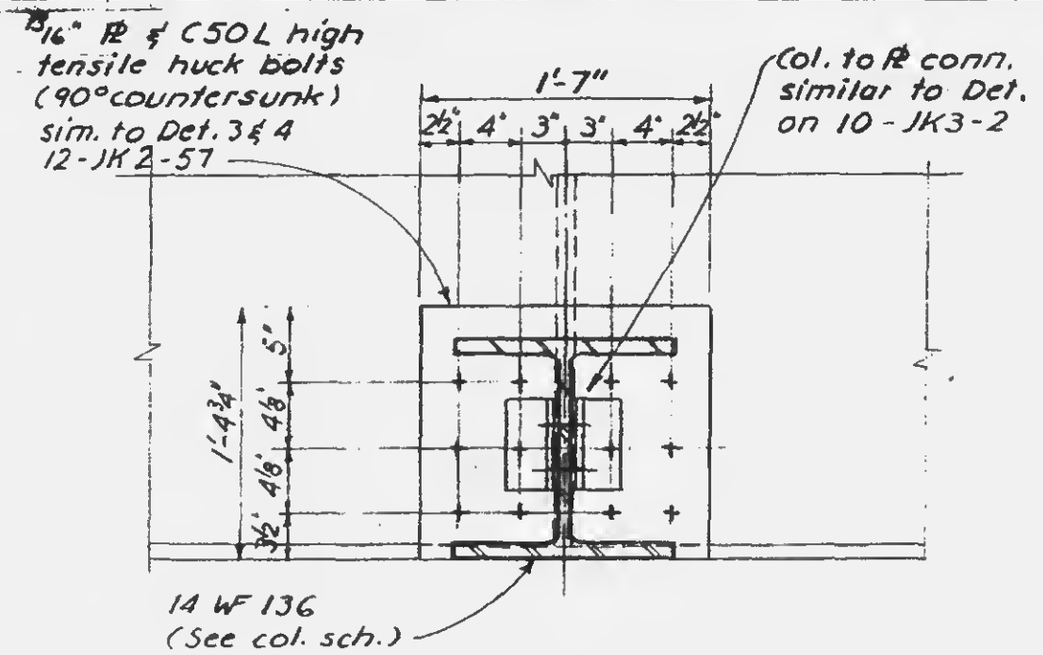
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PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 6-7-68

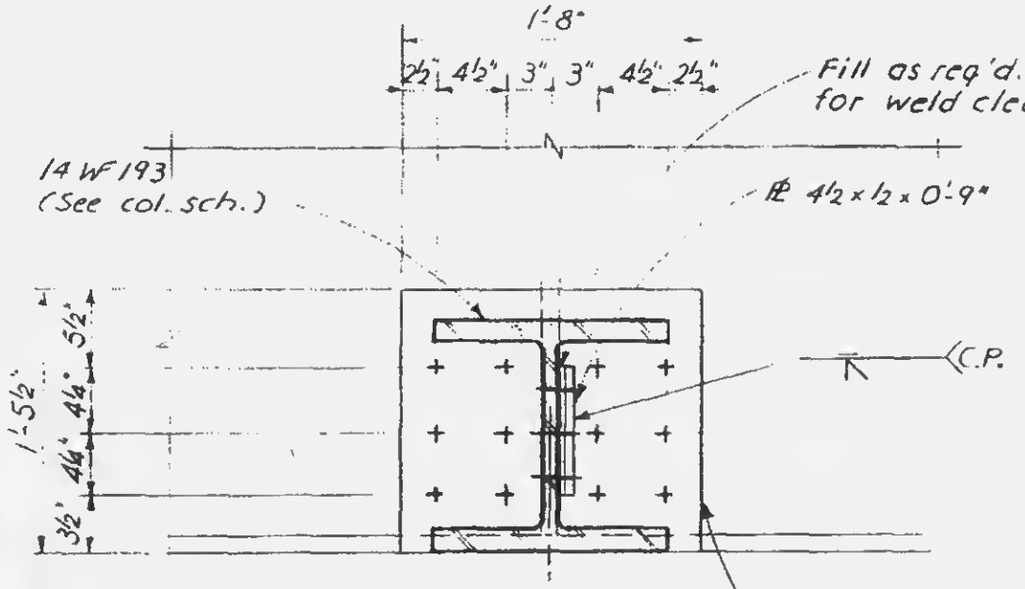
REVISIONS
7-19-68



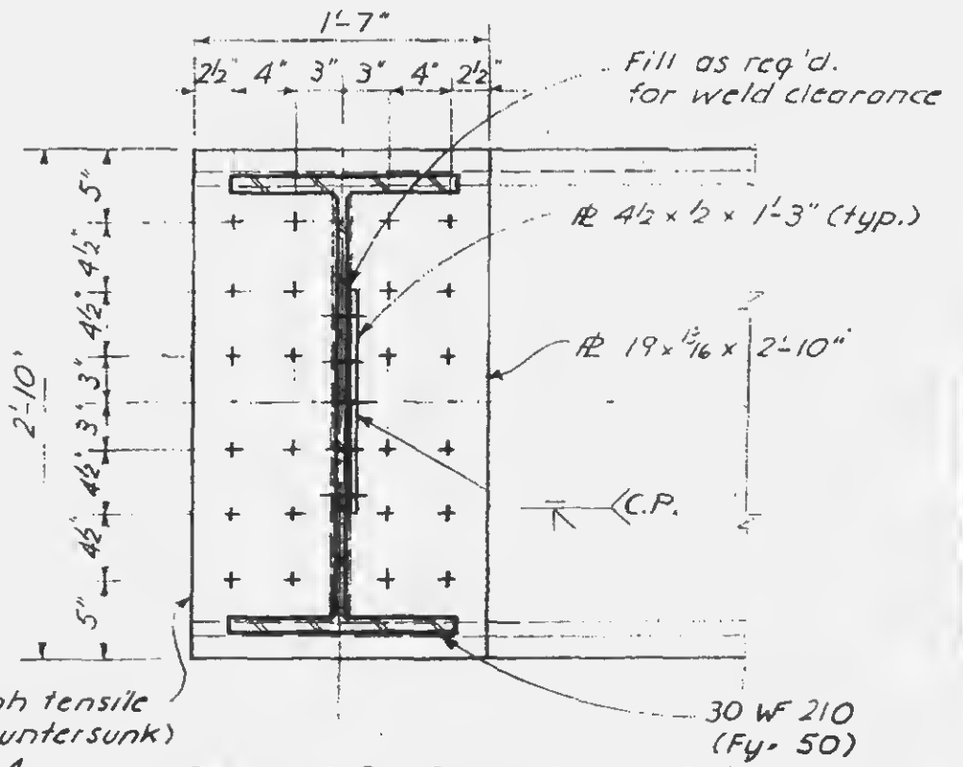
Section c-c (as shown)
Section d-d (opp. hand)



Detail 1



Detail 2
(looking up)



Detail 3 (as shown)
Detail 4 (opp. hand)

Notes:
1. All welds to be E70 xx.
2. All bolts to be A325 friction type.

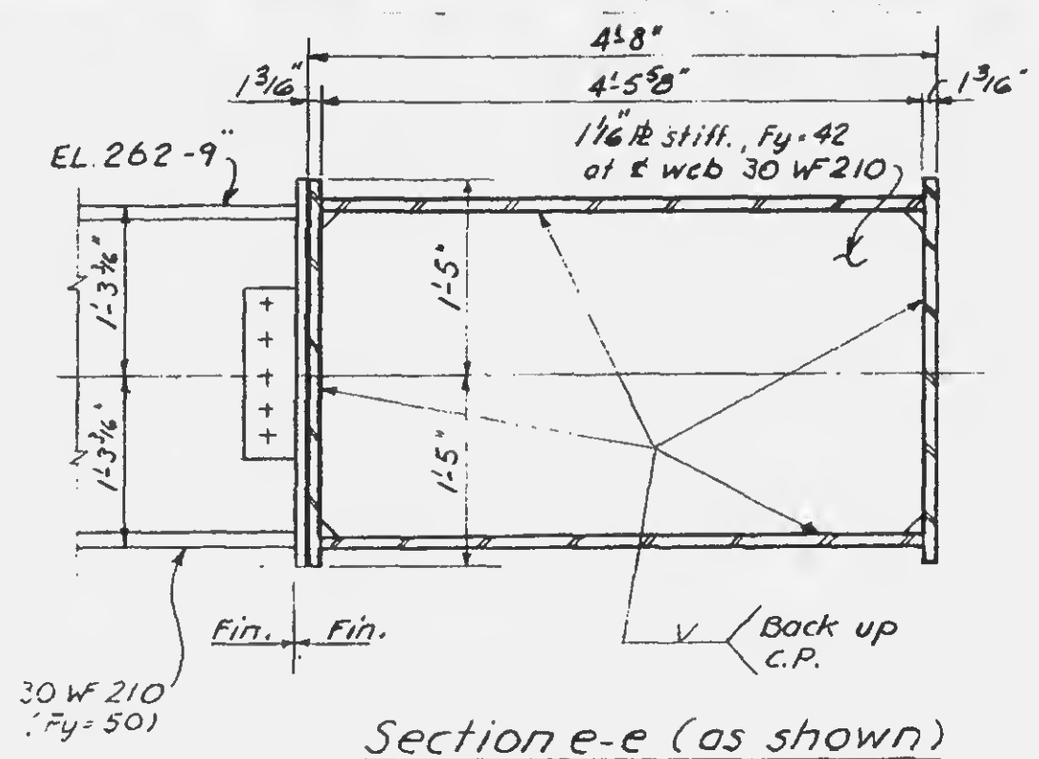
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UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-82

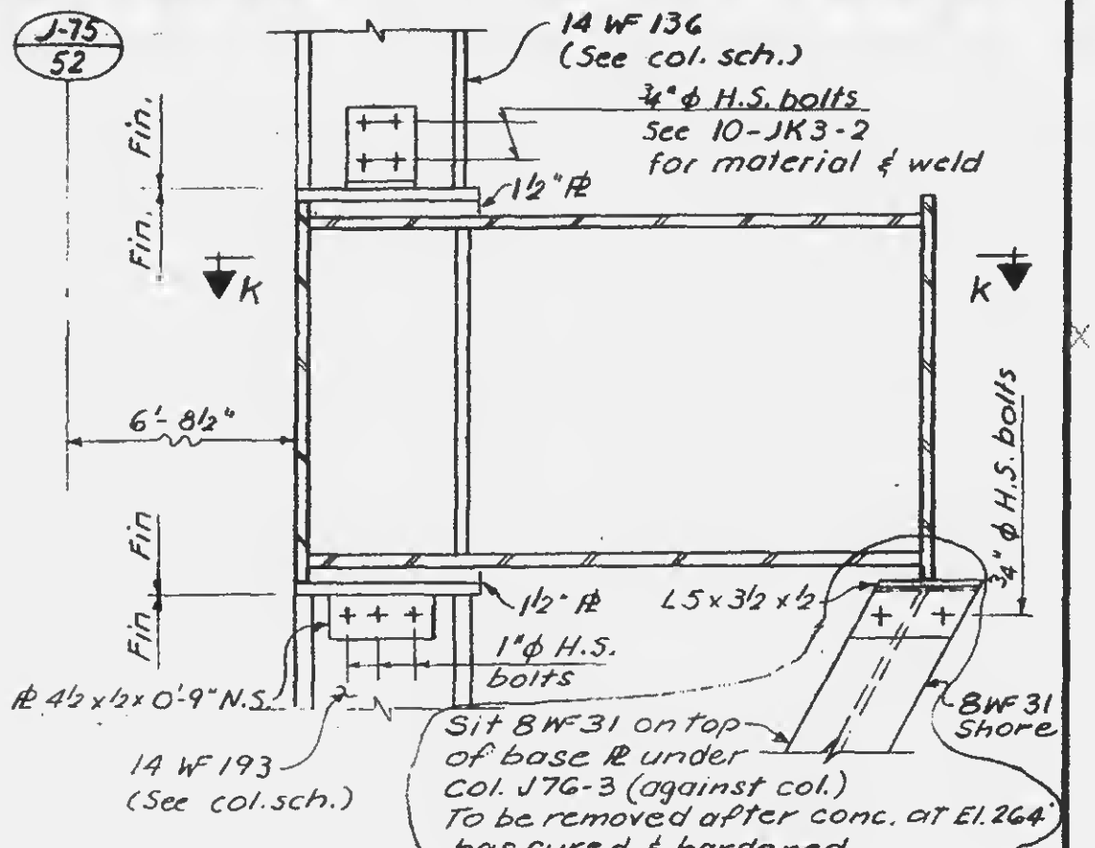
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAILS OF PLATE GIRDER | DATE: 6-7-68

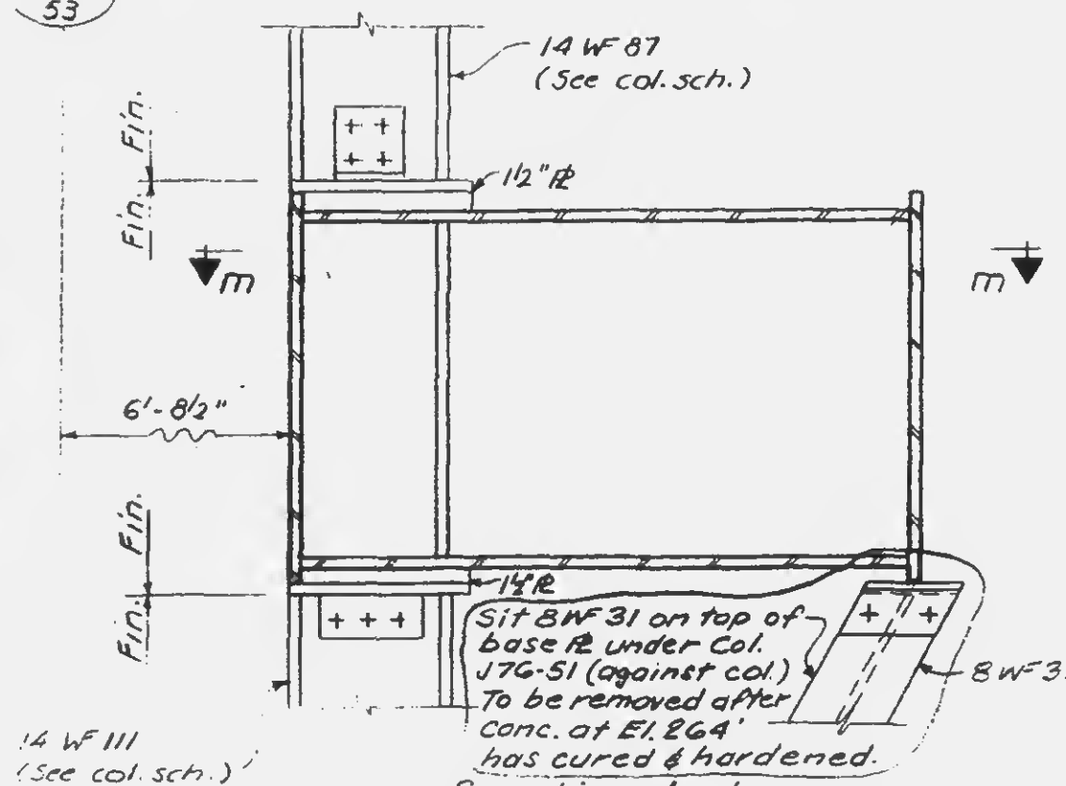
REVISIONS
7-19-68
4-4-69



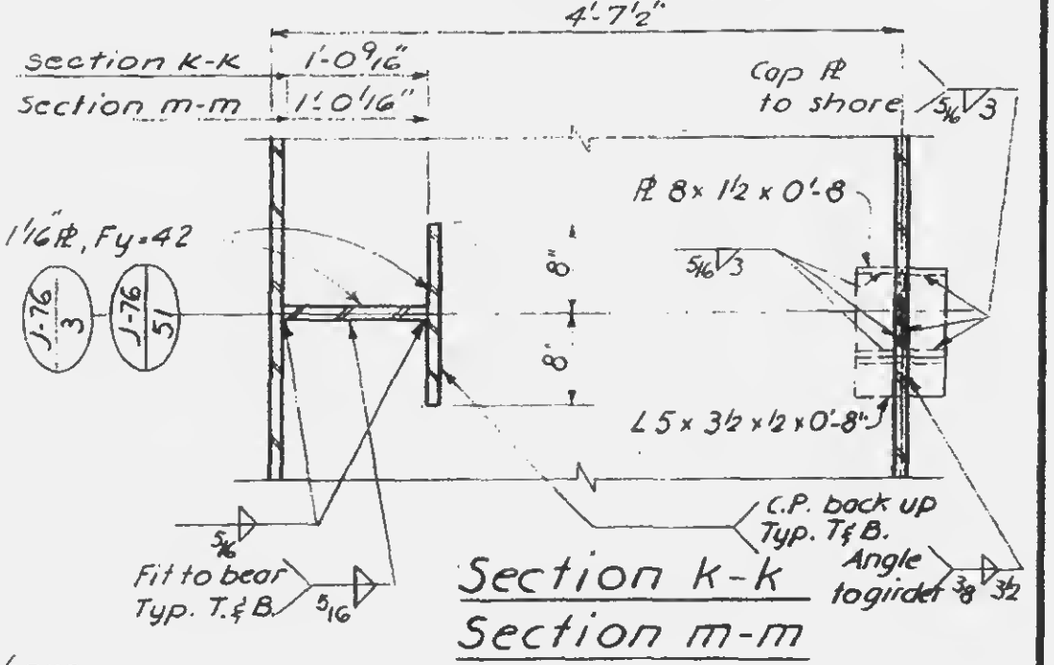
Section e-e (as shown)
Section f-f (opp. hand)



Section g-g



Section h-h
(Details not shown same as Sect. g-g)



Section k-k
Section m-m

Notes:
1. All welds to be E 70xx
2. All bolts to be A325 friction type.

12-JK2-83

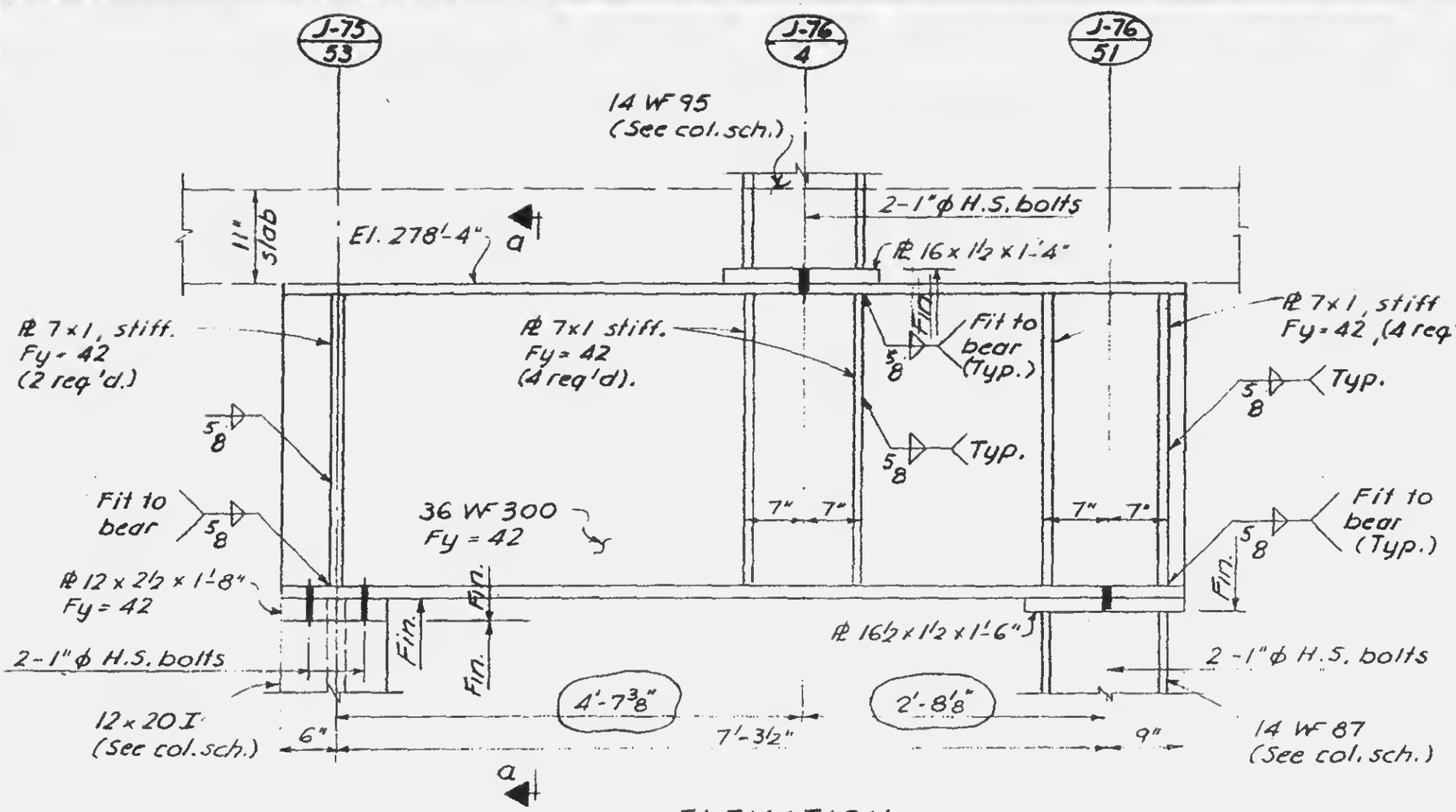
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DRAWN
SC
REVIEWED
E.L.

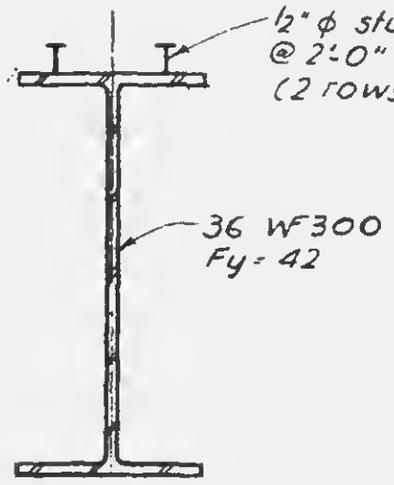
KILLING... CHRISTIANSEN - ROBERTSON — Steel & Civil Engineers

PROJECT: [illegible] — TITLE: GIRDER DETAIL — DATE: 6-1-68

REVISIONS
6-28-68
10-15-68



ELEVATION



Section a-a

Notes:
1. All welds to be E 70 xx.
2. All bolts to be A-325 friction type.
3. Col. cap PL detail similar to Detail on 10-JK2-7.

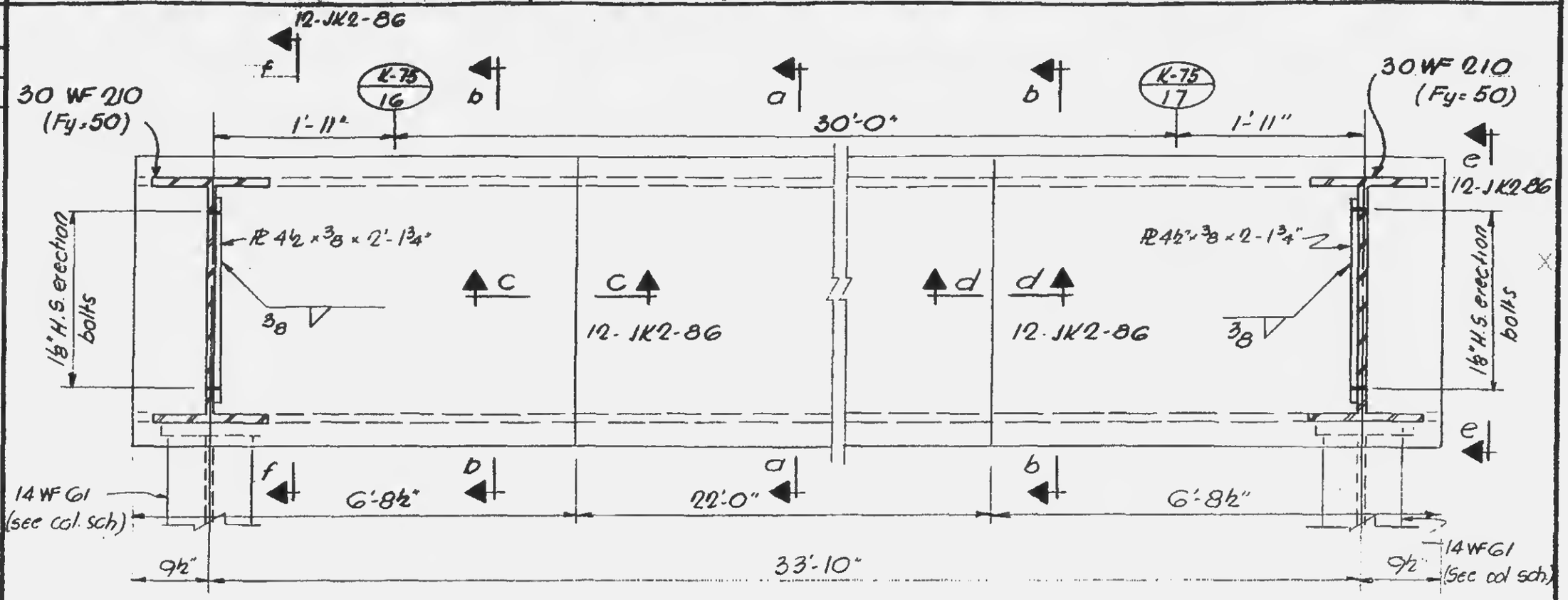
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12-JK2-84

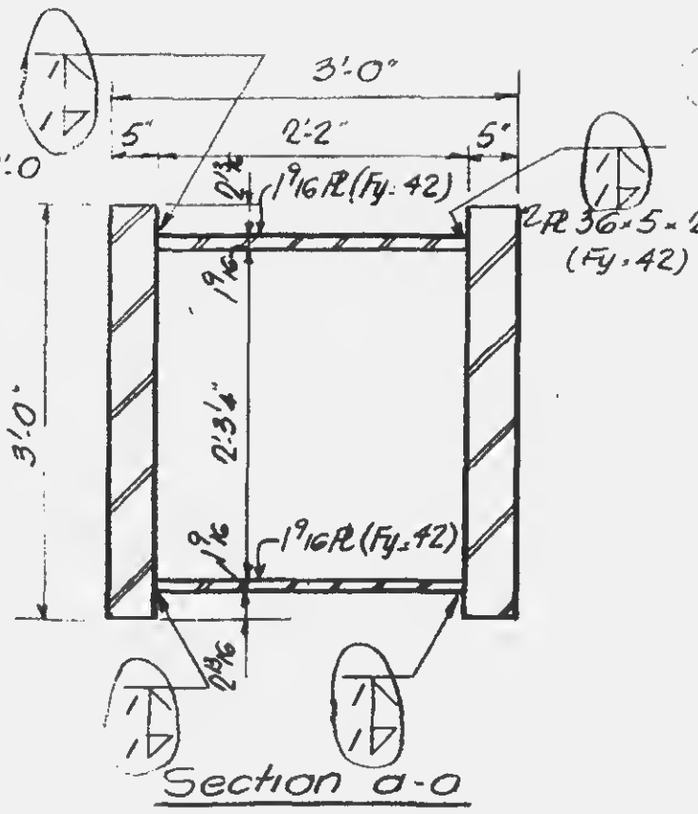
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 6-7-68

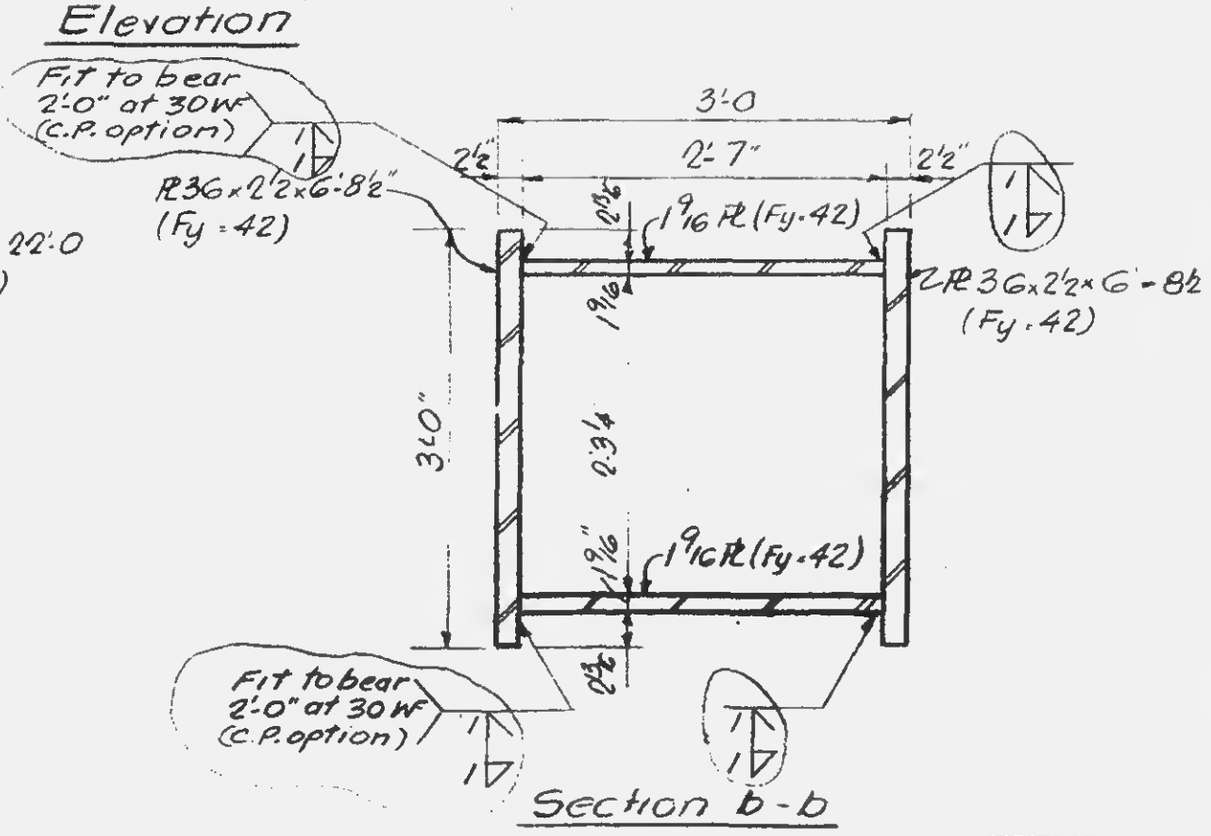
REVISIONS
7-19-68
1-6-69



Elevation



Section a-a



Section b-b

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DRAWN A.F.
REVIEWED E.L.

12-JK2-85

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

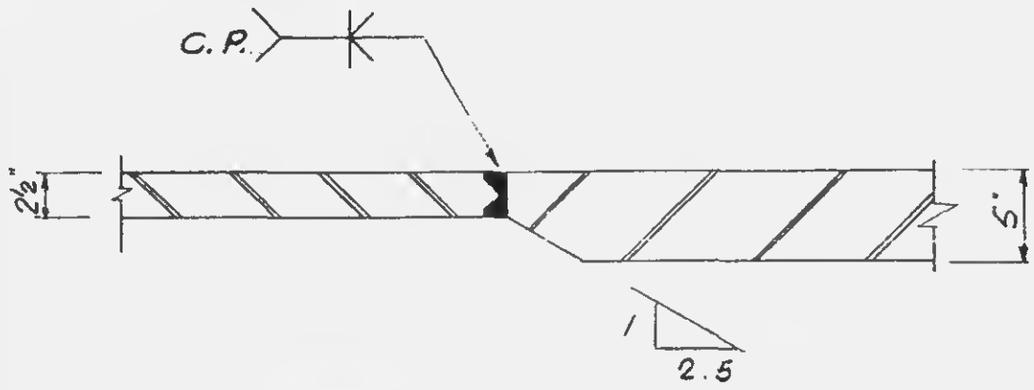
PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 6-7-68

REVISIONS

7-19-68

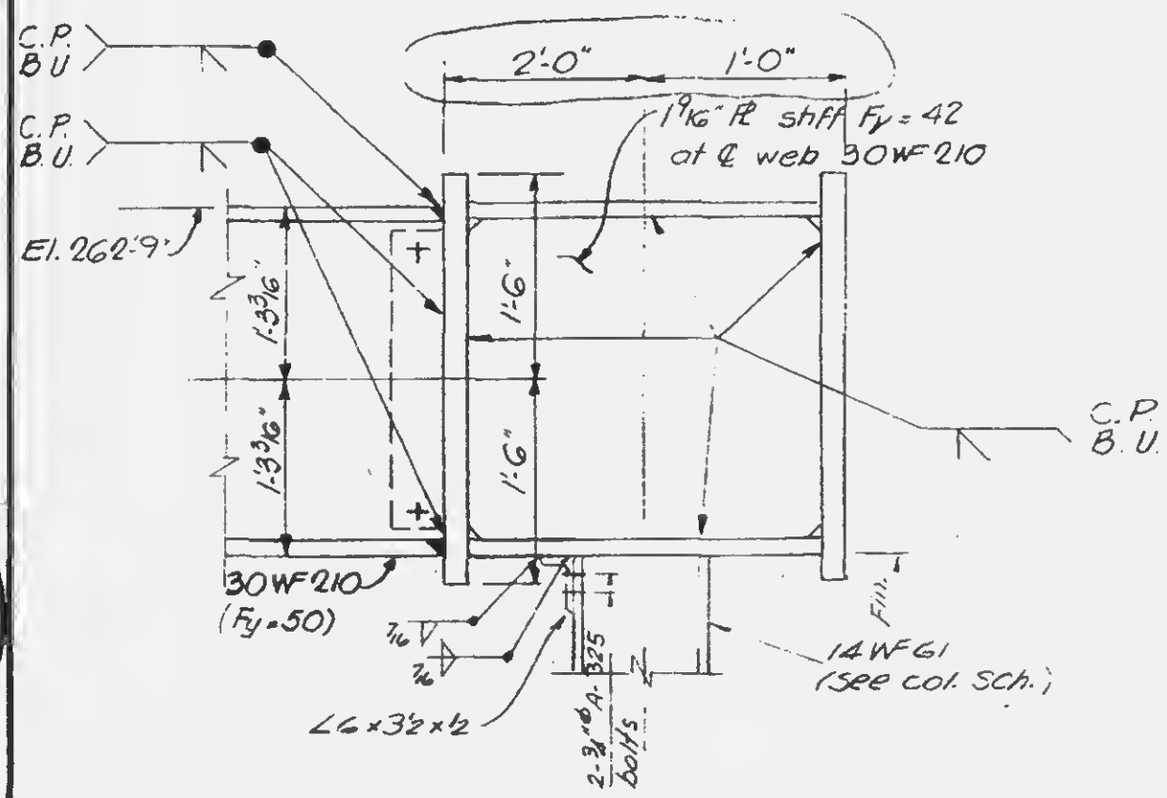
12-3-68

2-11-70



Section c-c (as shown)

Section d-d (opp hand)



Section e-e (as shown)

Section f-f (opp hand)

Note:
See also, Dwg. SK-4-1-284 (12-22-69)
(Change No. 533.058)

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

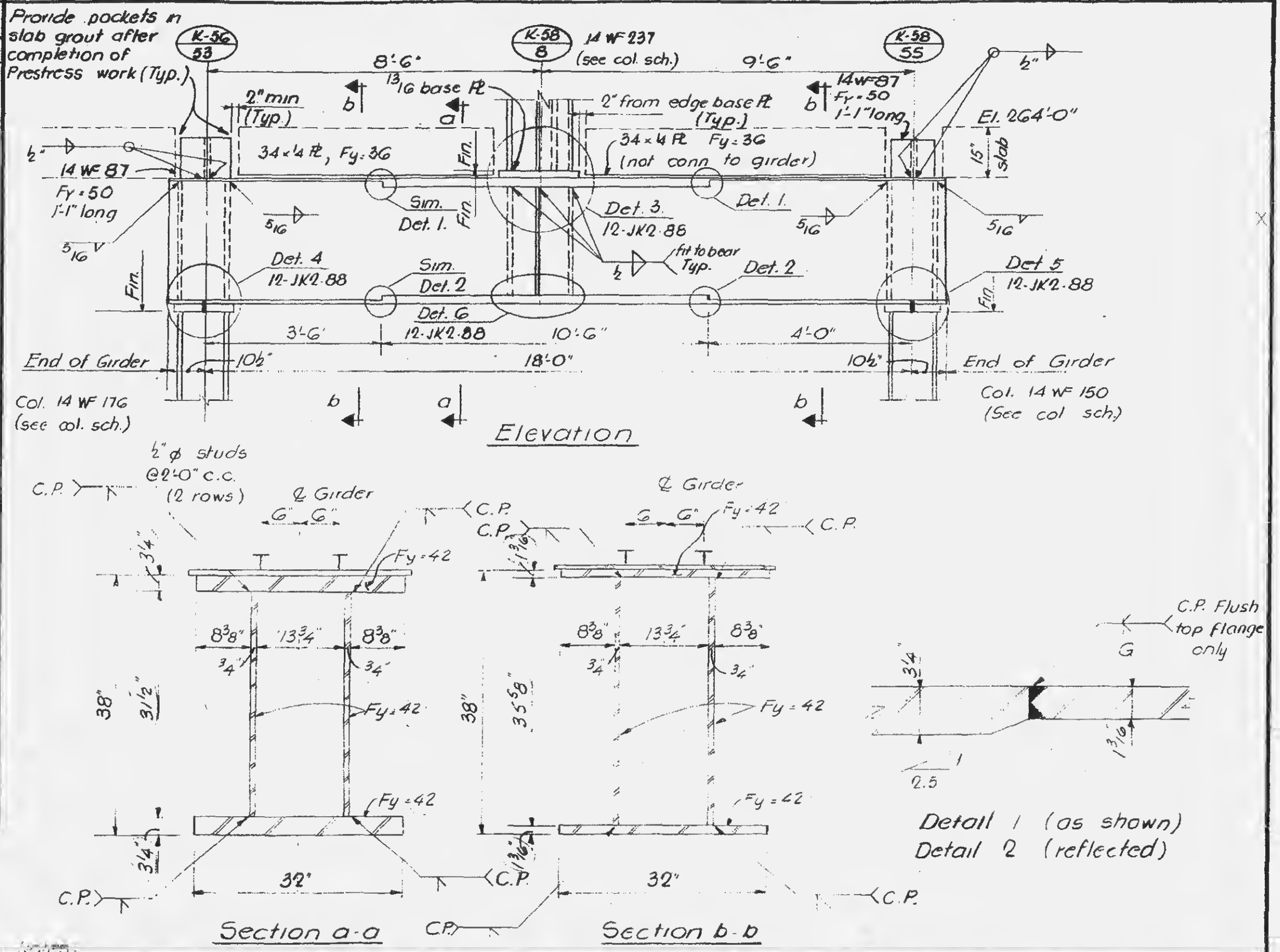
DRAWN
S.C.
REVIEWED
E.L.

12-JK2-86

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 6-11-68

REVISIONS
7-19-68



LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON No. 34360 REGISTERED IN THE STATE OF NEW YORK

Notes:

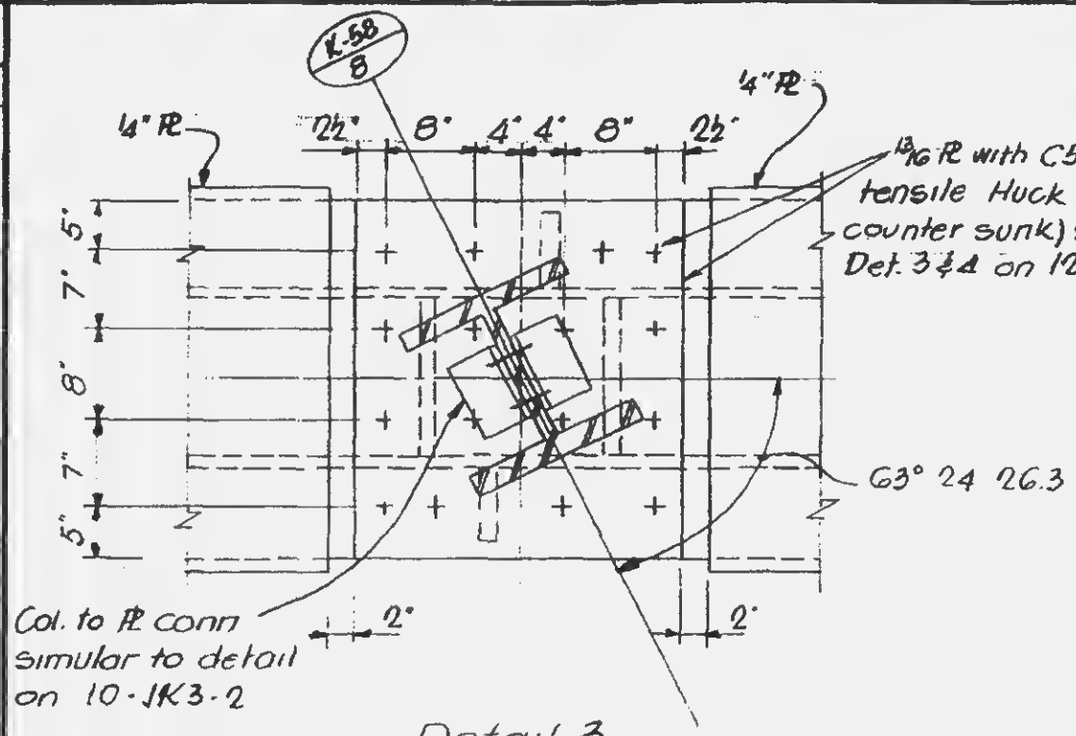
1. All welds to be E 70 xx
2. All bolts to be A 325 friction type, unless noted
3. Col. cap Pl Detail similar to Detail 104 (10-JK2-7)

12-JK2-87

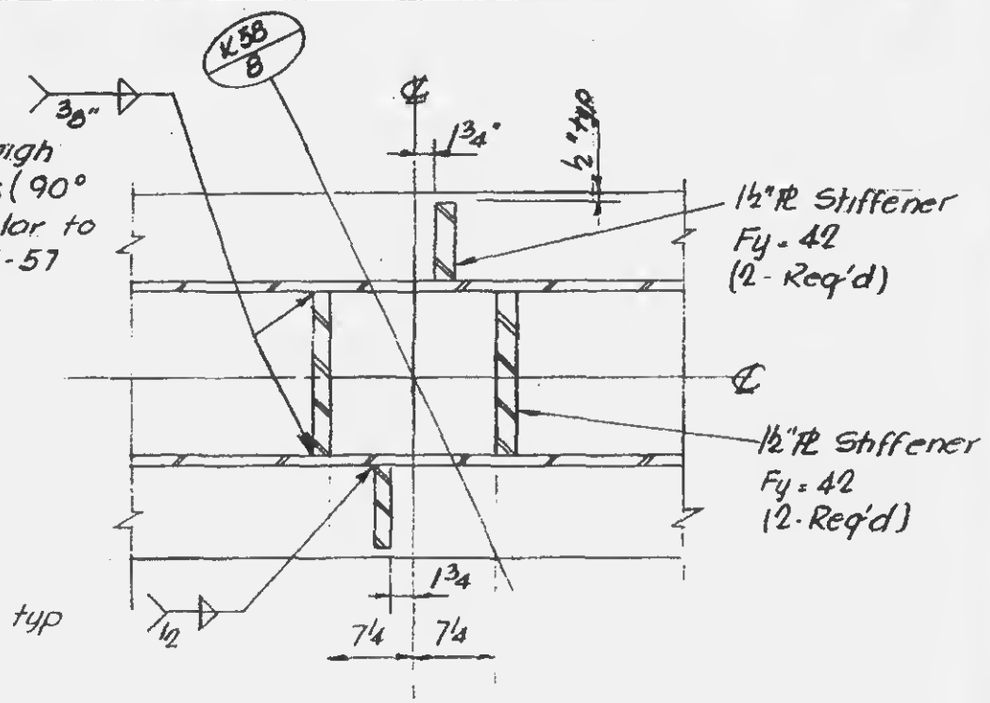
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 6-11-68

REVISIONS
7-19-68

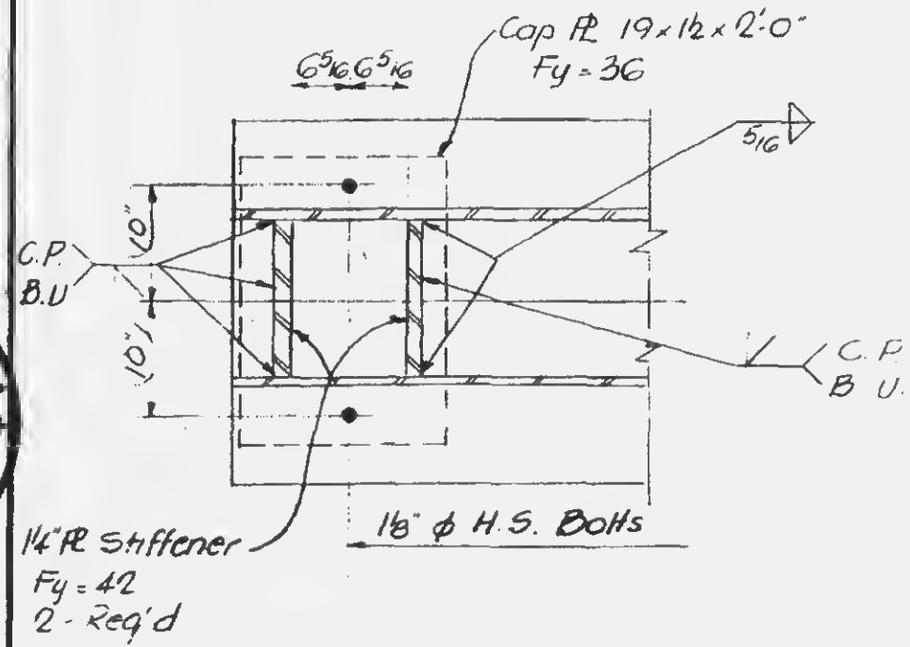


Detail 3



Detail 6

K58/55
K56/53



Detail 4 (as shown)
Detail 5 (opp hand)

Notes

1. All welds to be E 70 xx
2. All bolts to be A325 friction type, unless noted
3. Col. cap PL Det. similar to Det 104 (10-JK2-7)

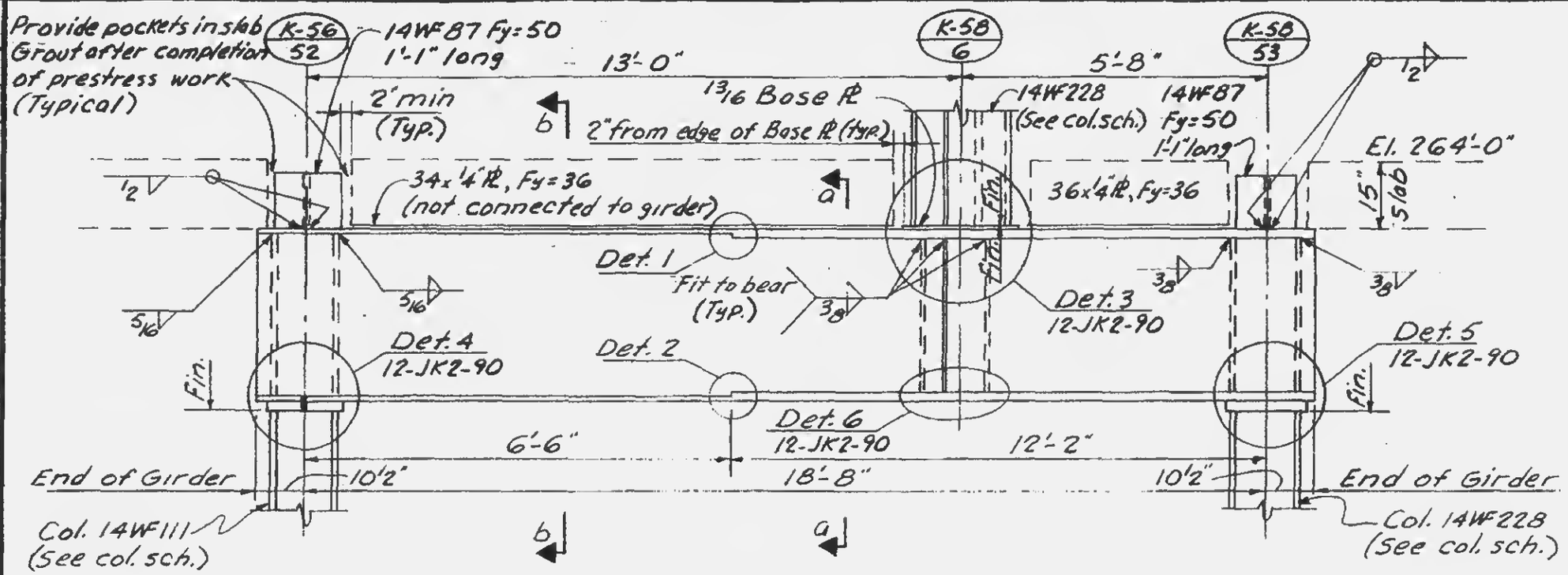
LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-88

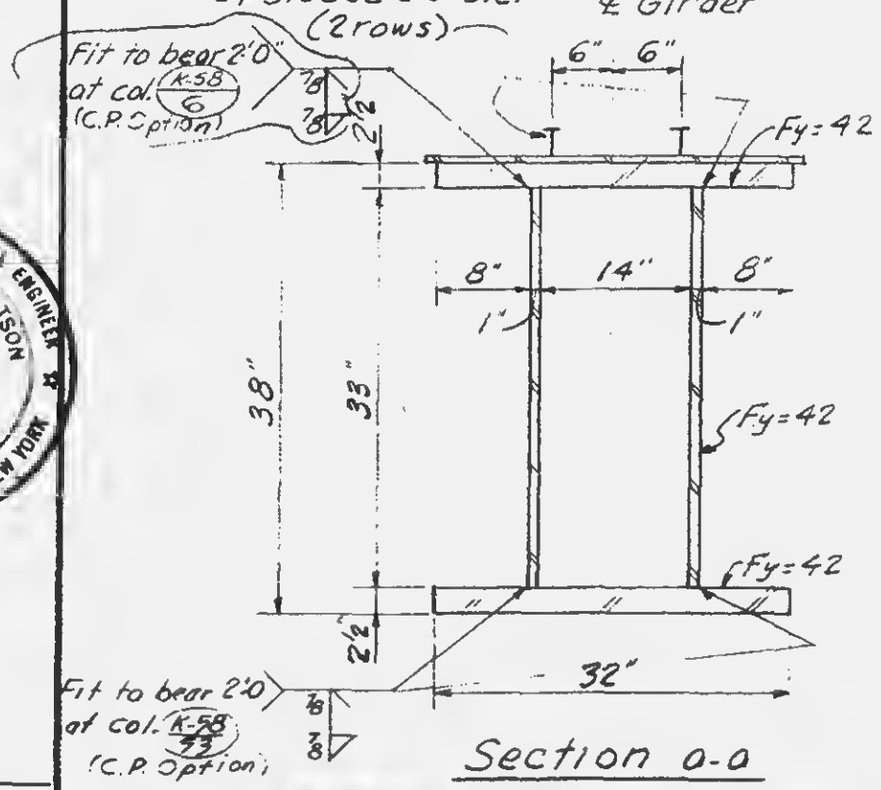
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 6-11-68

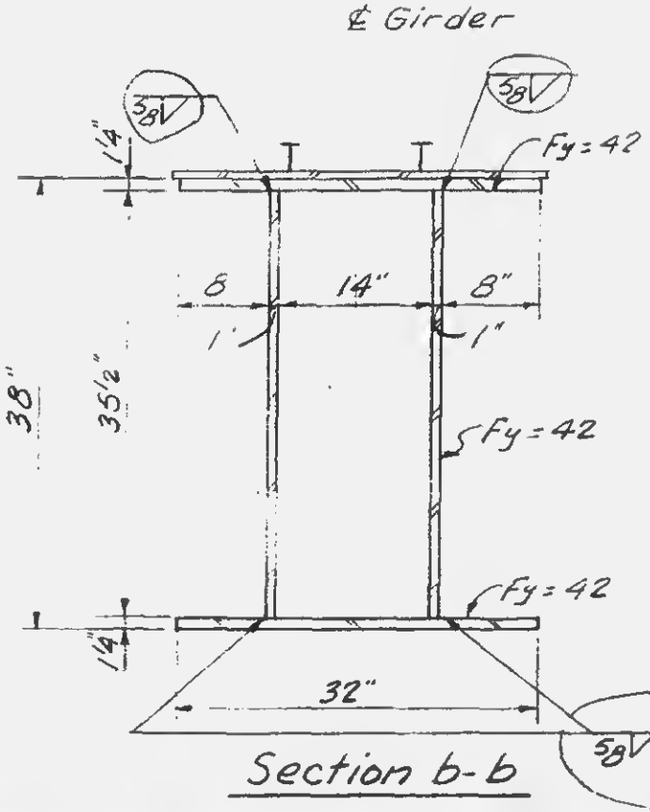
REVISIONS
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1-6-69



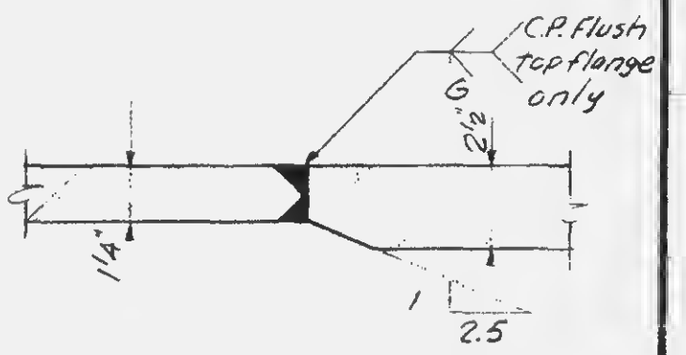
Elevation



Section a-a



Section b-b



Detail 1 (as shown)
Detail 2 (reflected)

Notes.
1. All welds to be E 70 xx
2. All bolts to be A325 friction type, unless noted.
3. Col. cap & Detail similar to Detail 104 (10-JK2-7)

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DESIGNED
DRAWN A.F.
REVIEWED E.L.

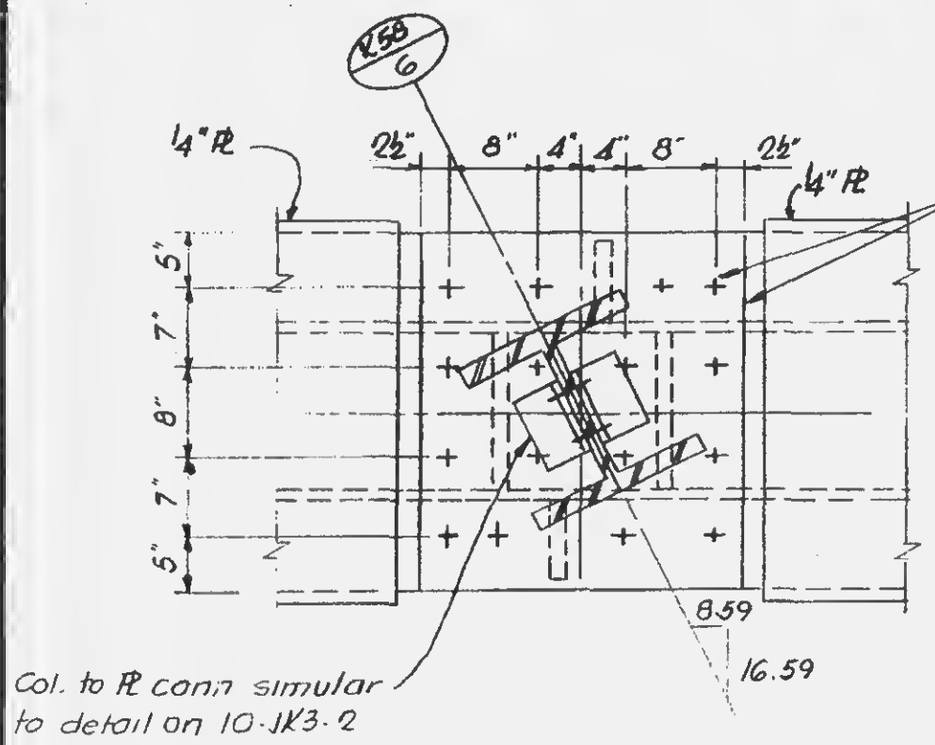
12-JK2-89

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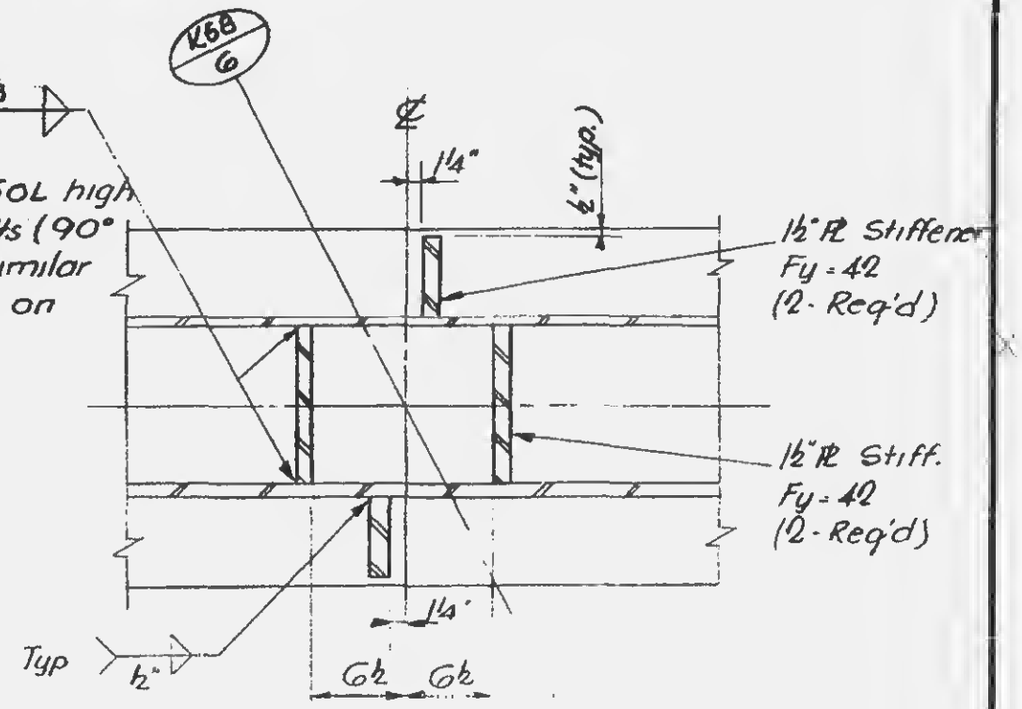
PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 6-11-68

REVISIONS

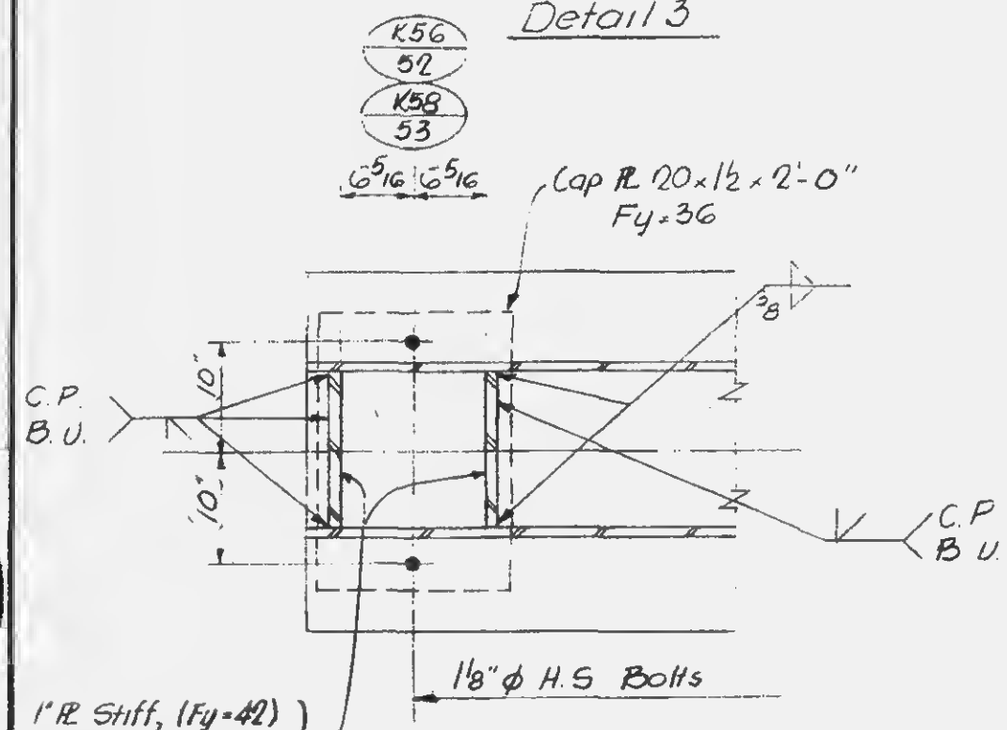
7-19-68



Detail 3



Detail 6



Detail 4 (as shown)
Detail 5 (opp hand)

Notes:

1. All welds to be E 70 xx
2. All bolts to be A 325 friction type, unless shown
3. Col. cap PL Det. similar to Det. 104 (10-JK2-7)

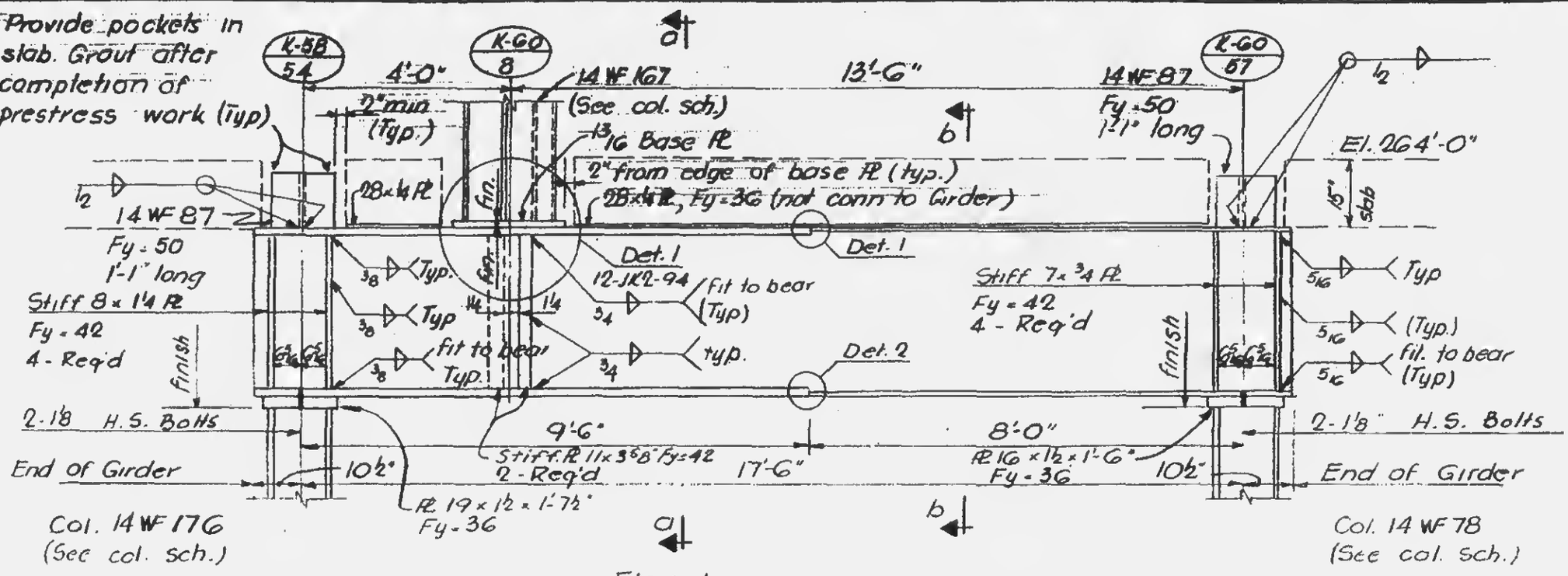
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-90

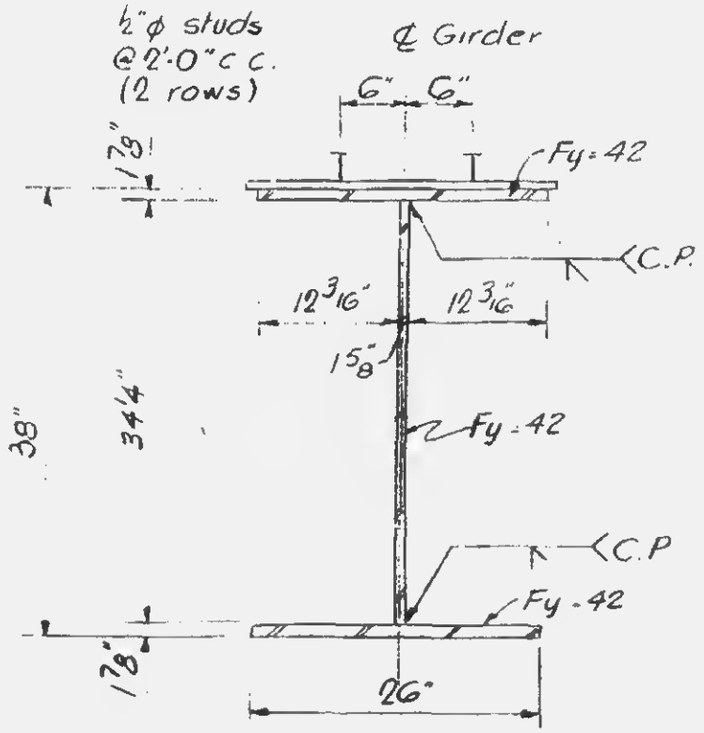
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 6-11-68

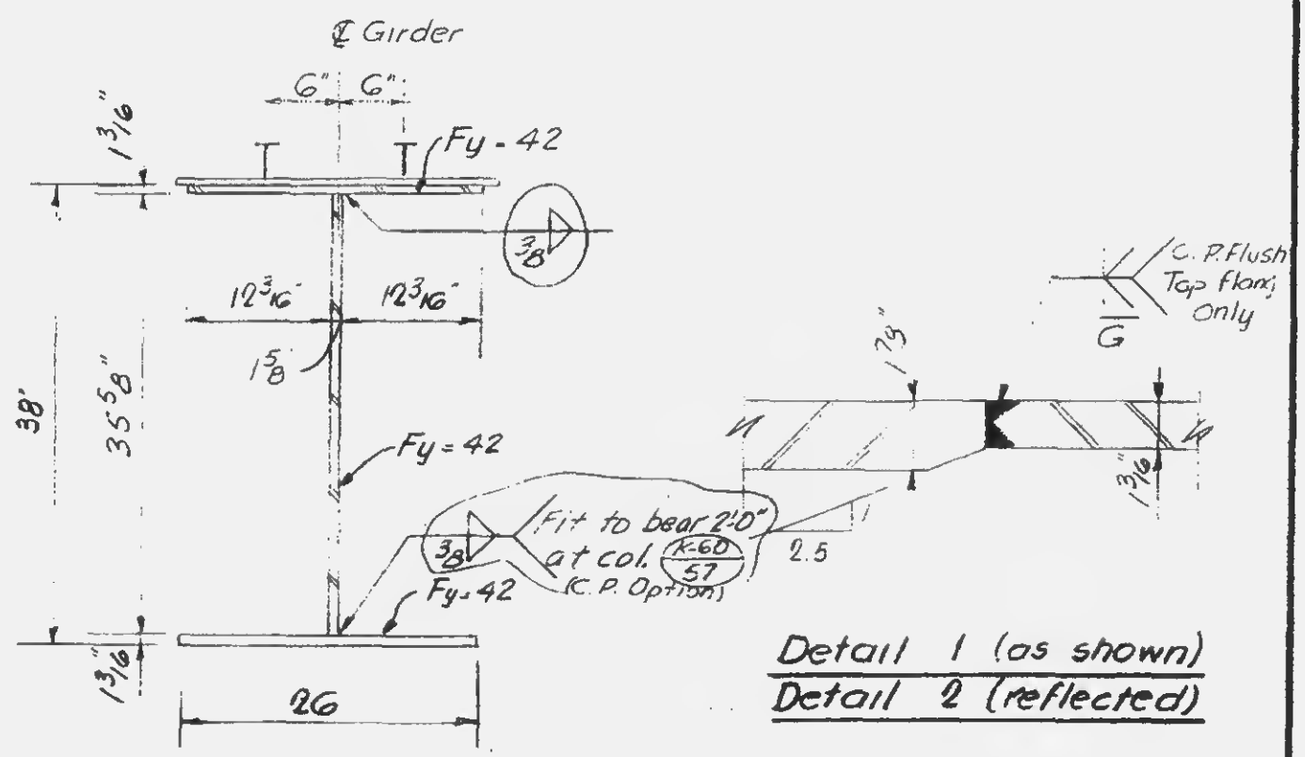
REVISIONS
7-19-68
1-6-69



Elevation



Section a-a



Section b-b

Detail 1 (as shown)
Detail 2 (reflected)

Notes:
1. All welds to be E 70 xx
2. All bolts to be A 325 friction type, unless noted
3 Col cap Pl Detail similar to Detail 104 (10-JK2-7)

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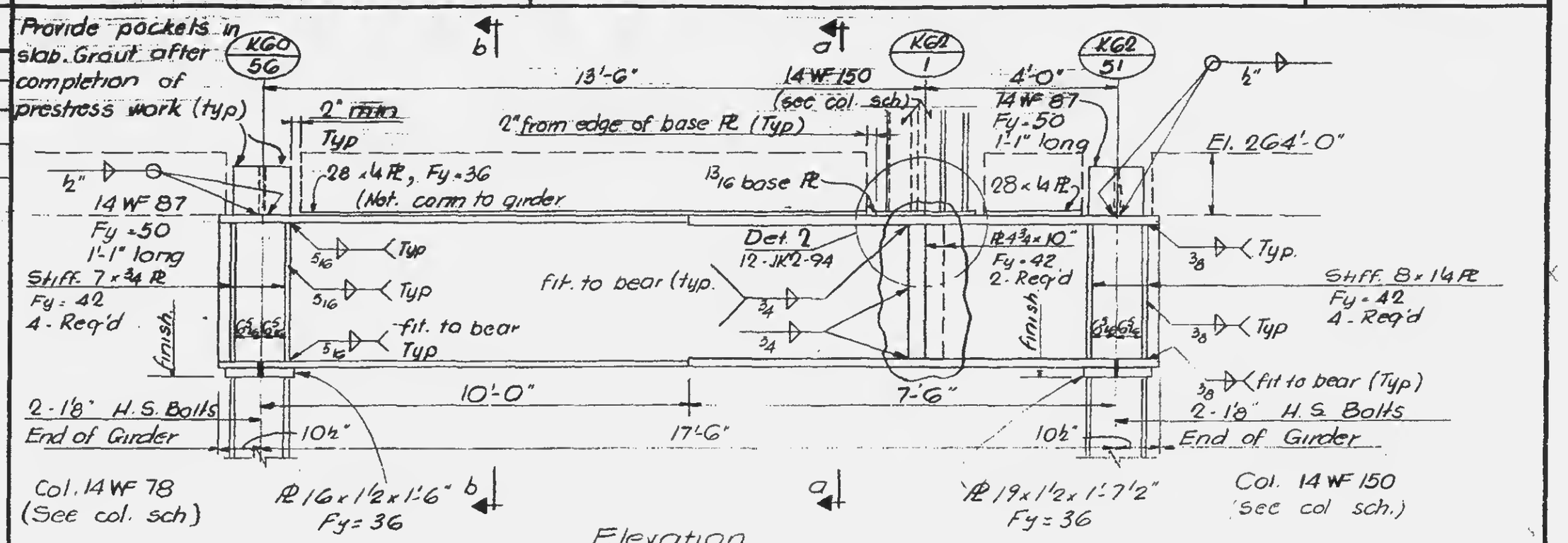
DRAWN A.F.
REVIEWED E.L.

12-JK2-91

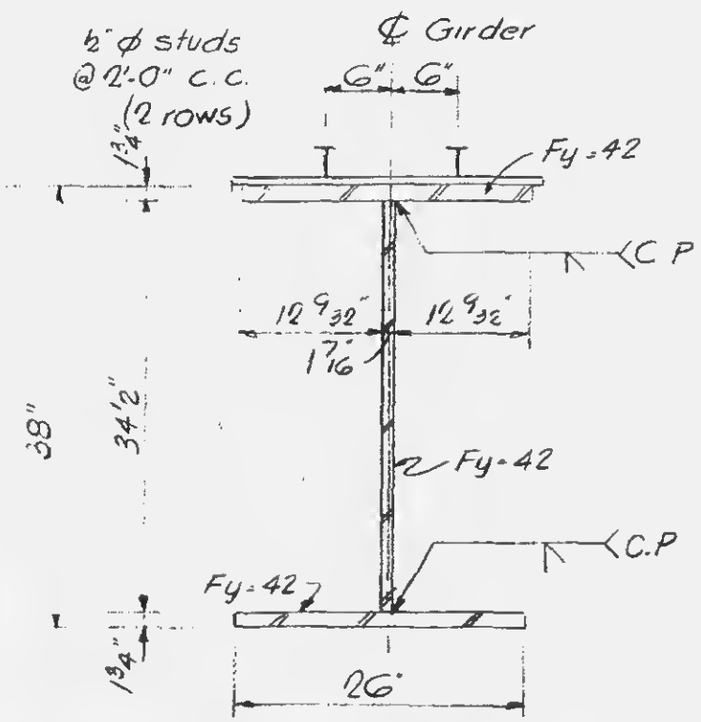
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE DETAIL | DATE: 6-11-68

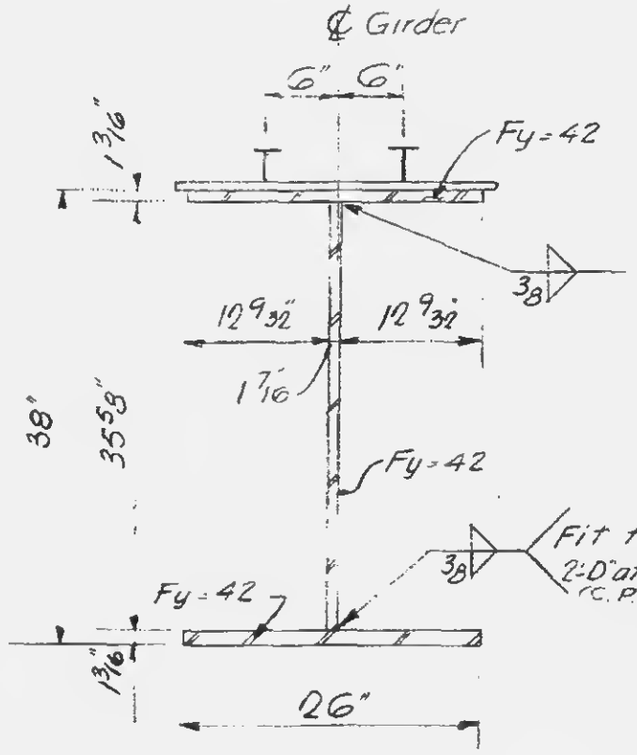
REVISIONS
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9-4-68
1-6-69
2-19-69



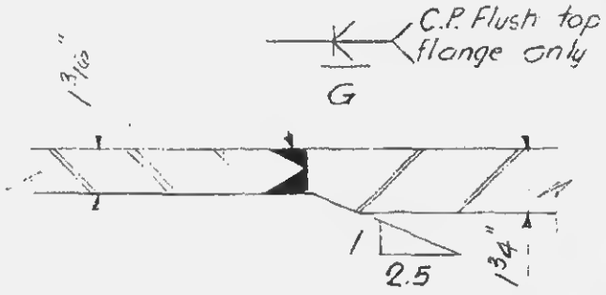
Elevation



Section a-a



Section b-b



Detail 1 (as shown)
Detail 2 (reflected)

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DRAWN A.F.
REVIEWED E.L.

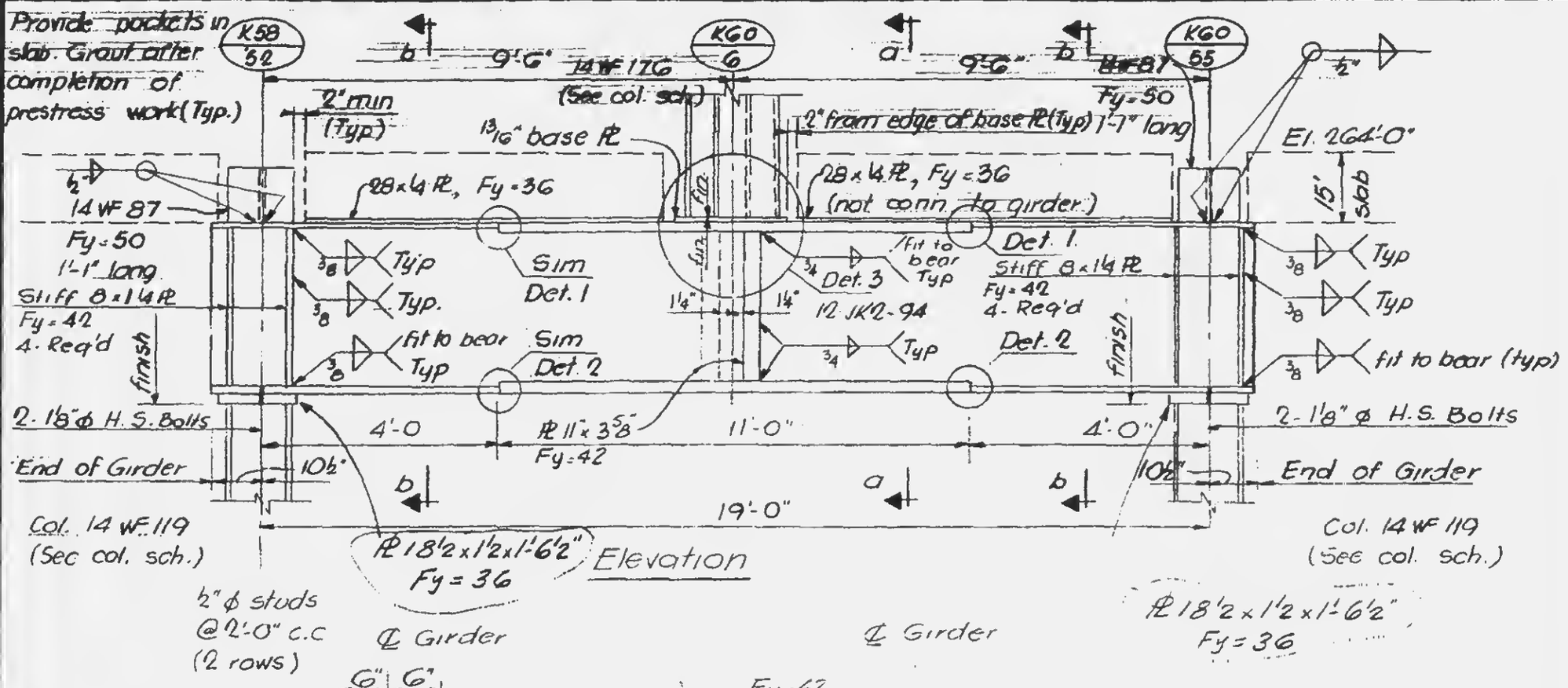
Notes:
1. All welds to be E 70 xx
2. All bolts to be A 325 friction type, unless noted
3. Col. cap Pl Detail similar to Detail 104 (10-JK2-7)

12-JK2-92

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 6-11-68

REVISIONS
7-19-68
9-4-68



Notes:

1. All welds to be E 70 xx
2. All bolts to be A325 friction type, unless noted
3. Col. cap Pl Detail similar to Detail 104 (10-JK2-7)

LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON No. 34360 LICENSED OF THE STATE OF NEW YORK

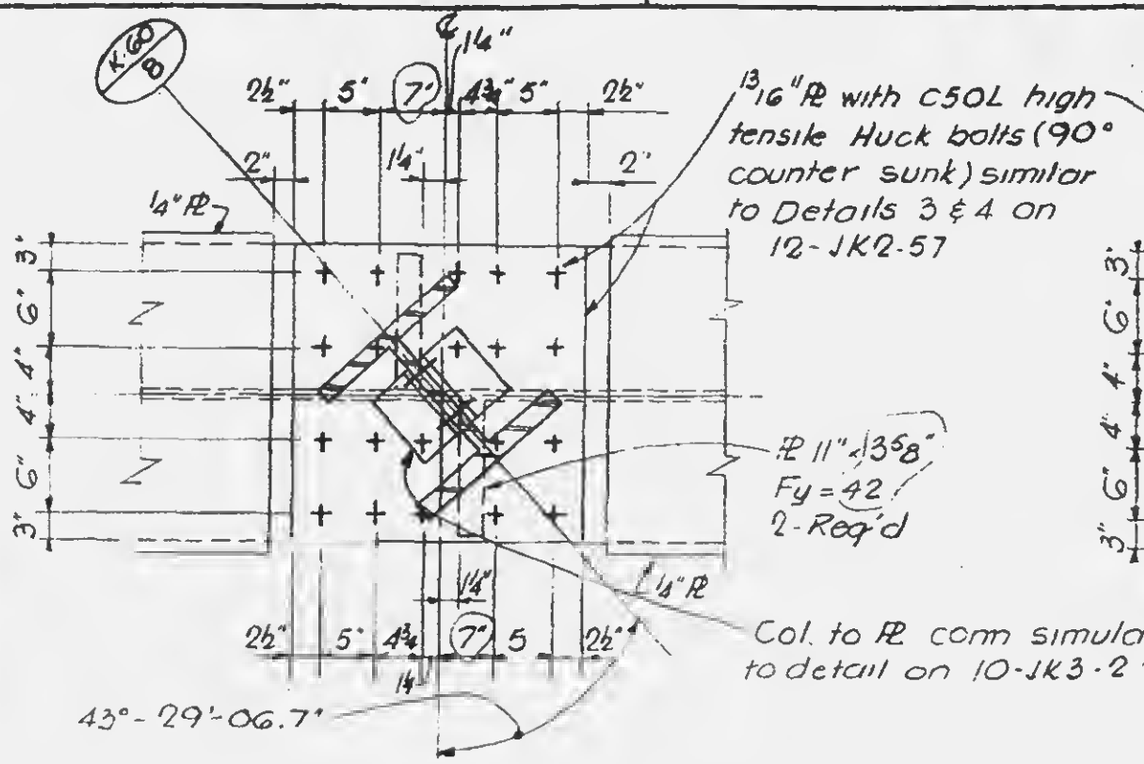
12-JK2-93

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 6-11-68

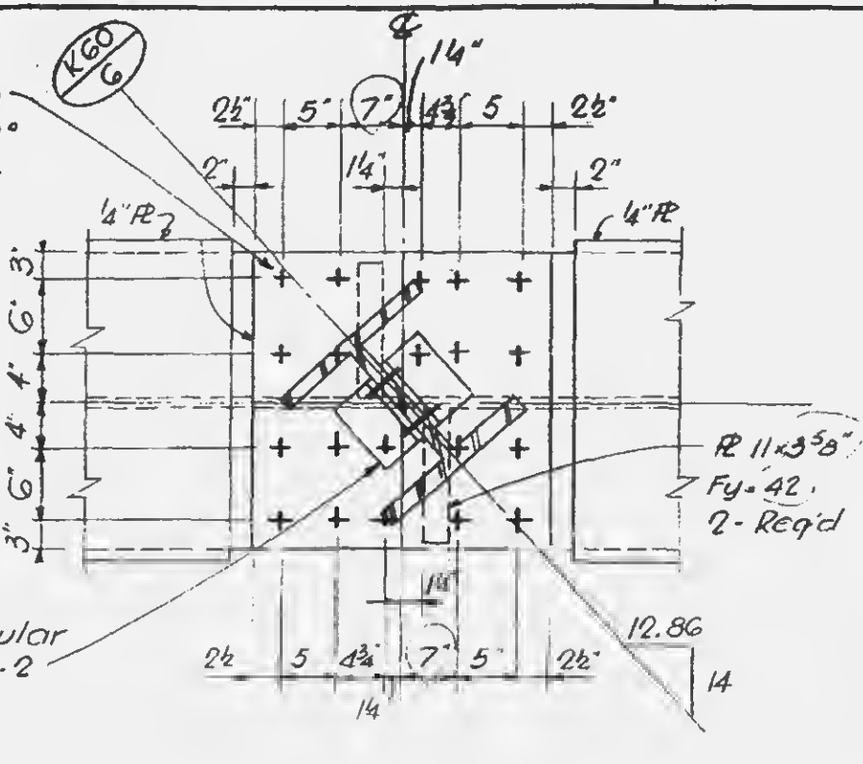
REVISIONS

7-19-68



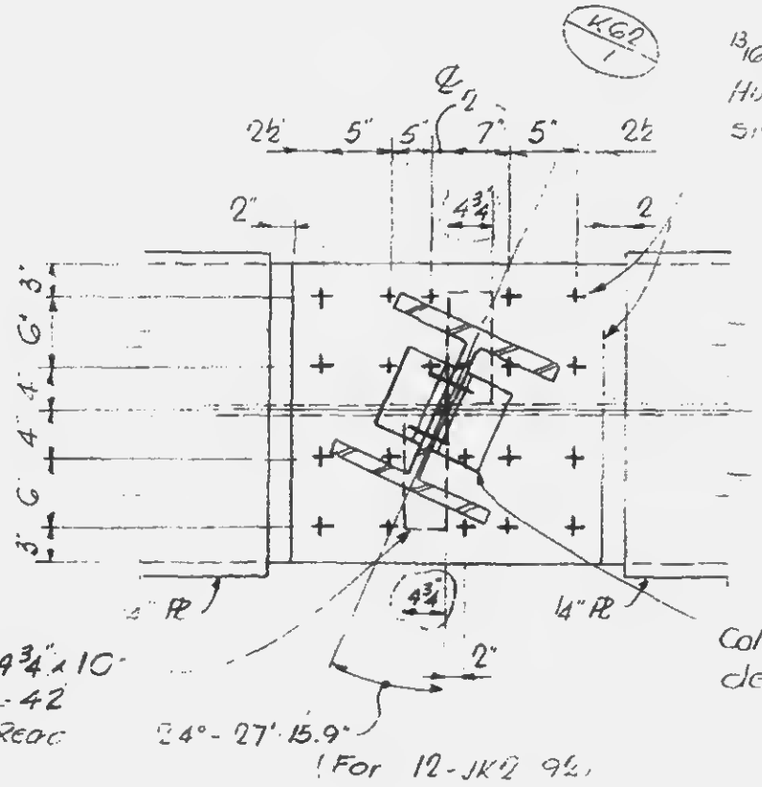
(For 12-JK2-91)

Detail 1



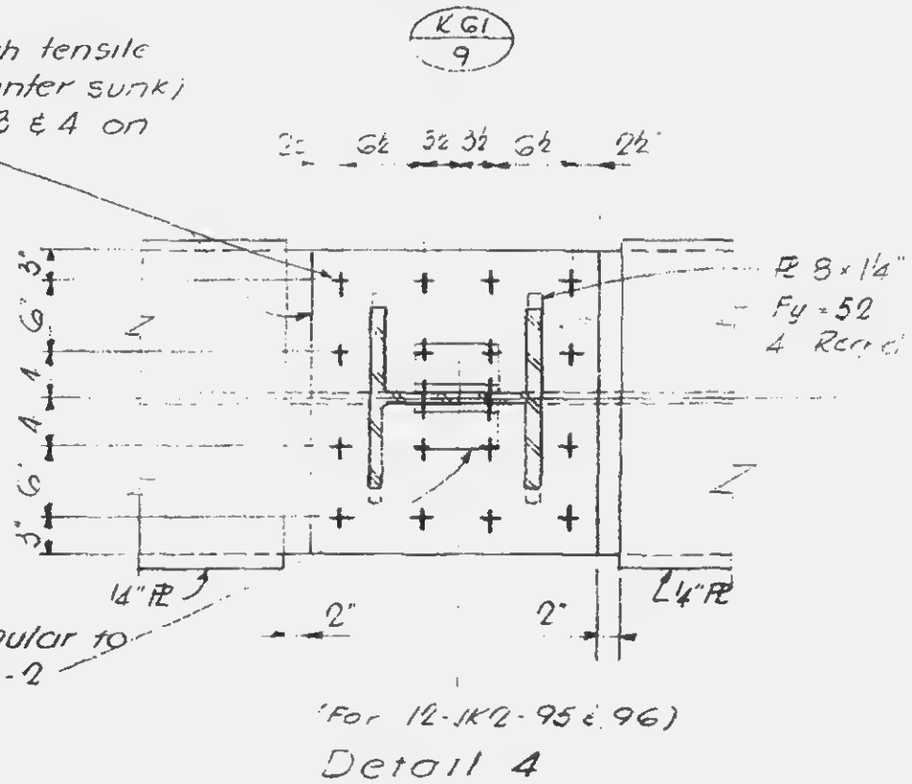
(For 12-JK2-93)

Detail 3



(For 12-JK2-92)

Detail 2



(For 12-JK2-95 & 96)

Detail 4

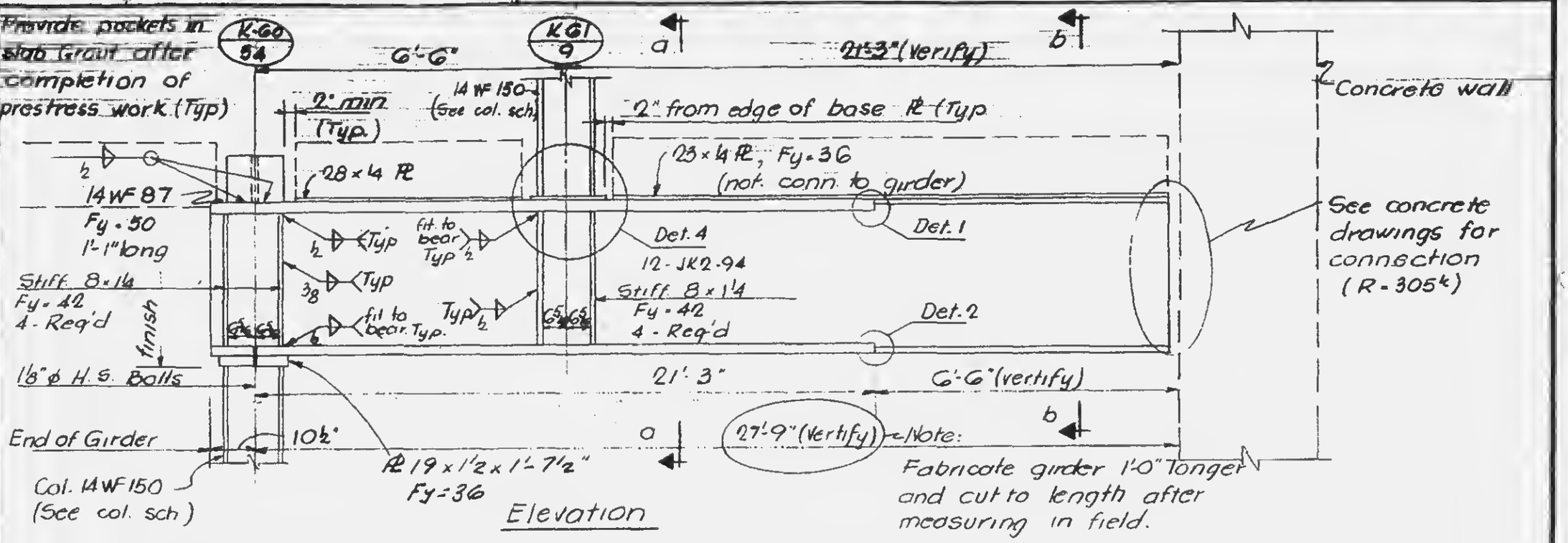
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-94

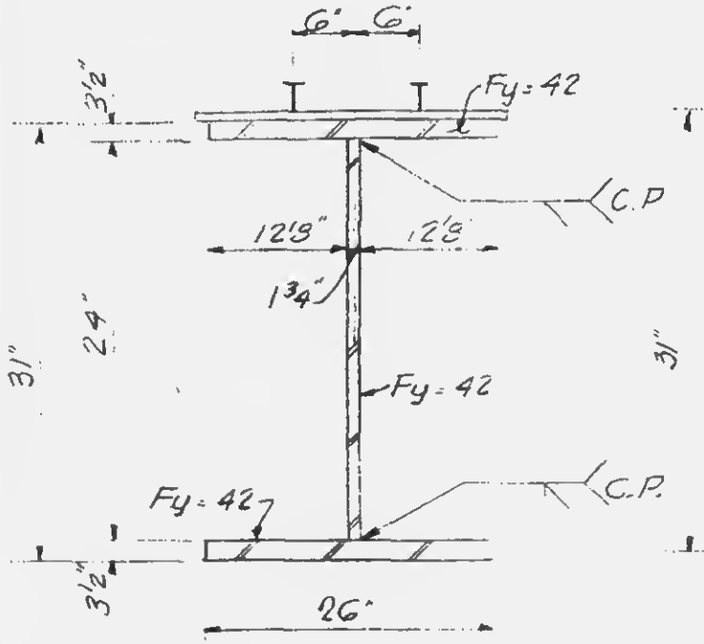
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

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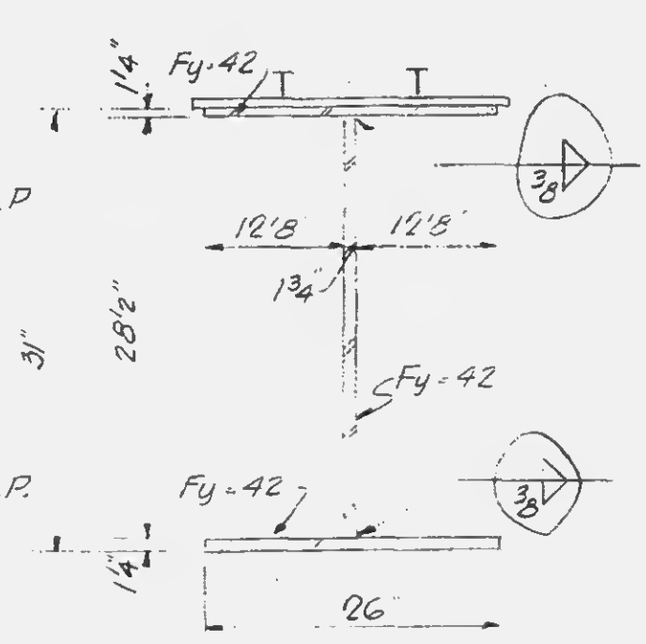
REVISIONS
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9-4-68
1-6-69



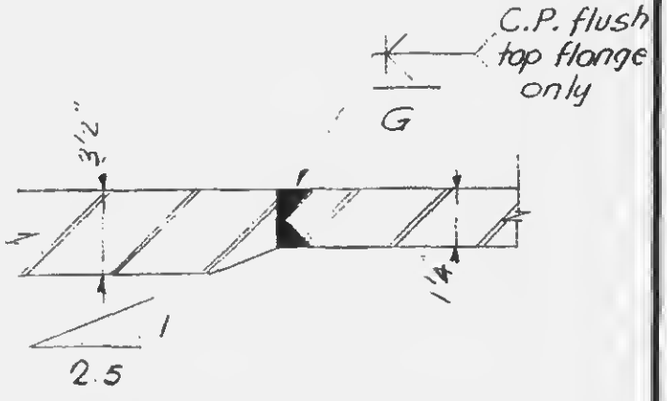
Elevation



Section a-a



Section b-b



Detail 1 (as shown)
Detail 2 (reflected)

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — STATE OF NEW YORK

DRAWN A.F.
REVIEWED E.L.

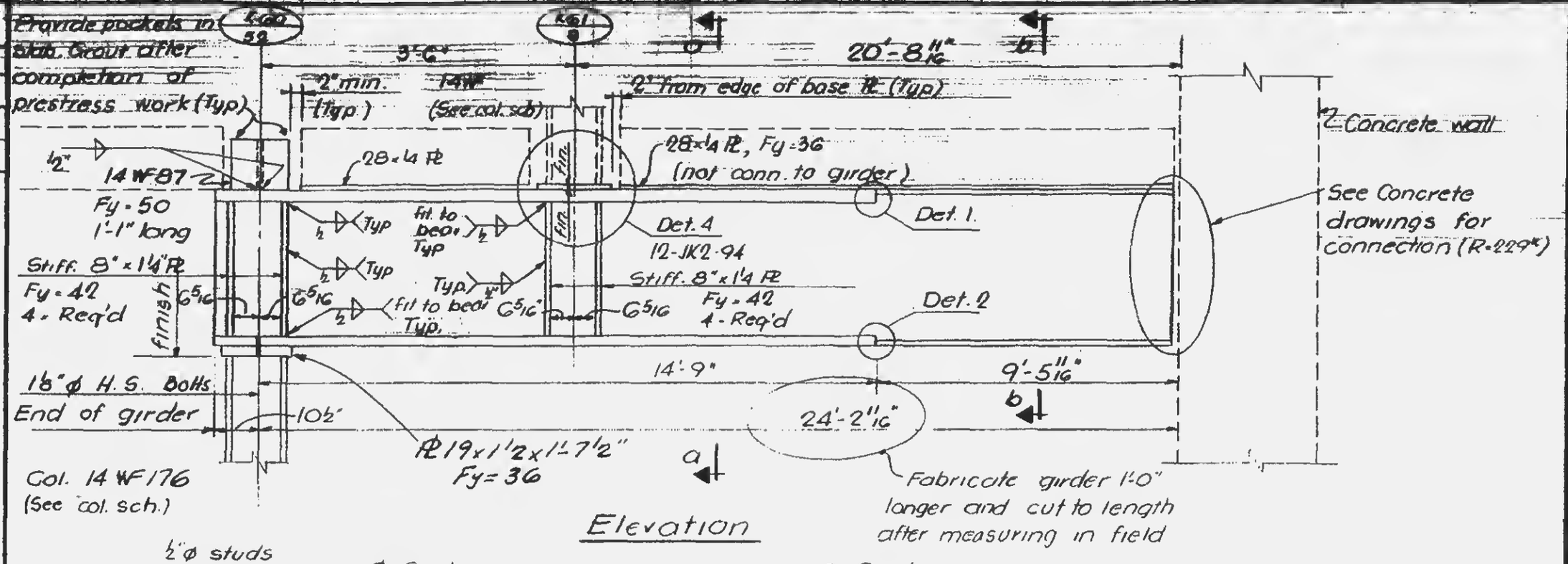
Notes:
1. All welds to be E 70 x x
2. All bolts to be A 325 friction type, unless shown
3 Col. cap PL Detail similar to Detail 104 (10-JK2-7)

12-JK2-95

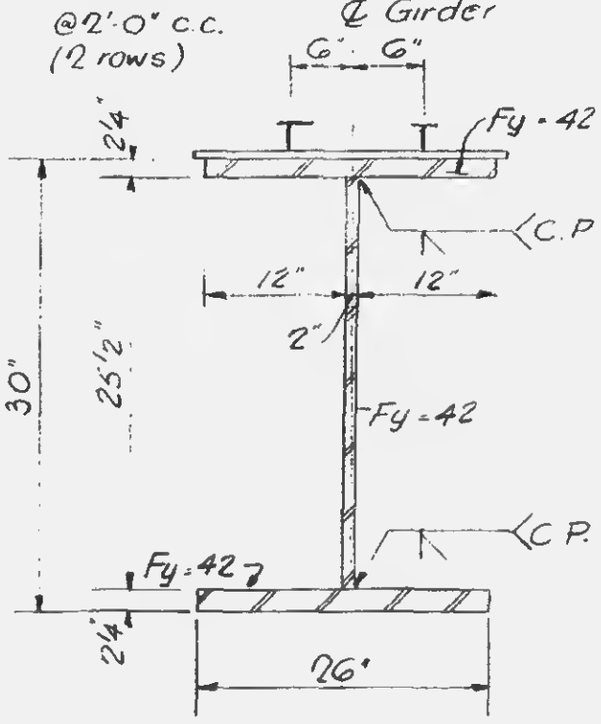
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON

PROJECT: [illegible] TRADE CENTER — TITLE: [illegible] — DATE: 6-11-68

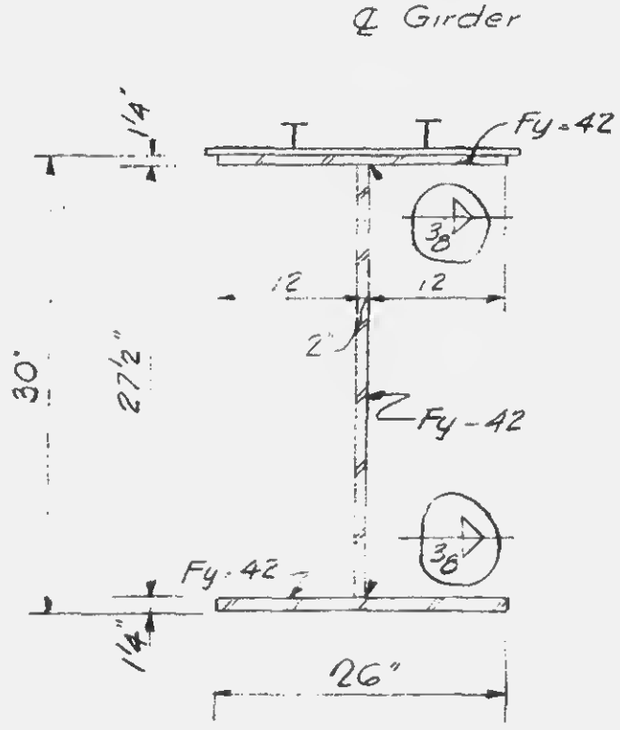
REVISIONS
7-19-68
9-4-68
10-15-68
1-6-69



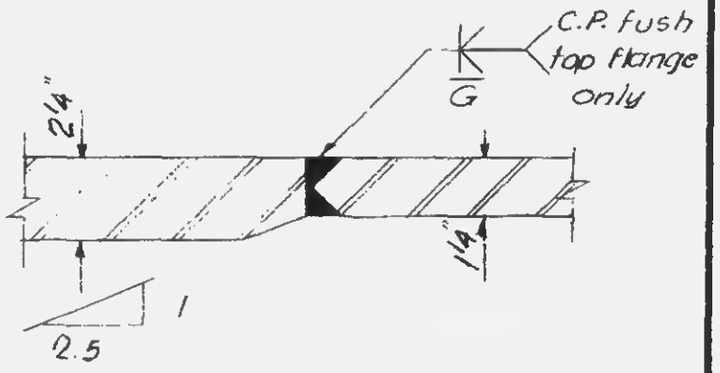
Elevation



Section a-a



Section b-b



Detail 1 (as shown)
Detail 2 (reflected)

Notes:

1. All welds to be E 70 xx
2. All bolts to be A325 friction type. unless shown
3. Col cap PL Det. similar to Det 104 (10-JK2-7)

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DRAWN A.F.
REVIEWED E.L.

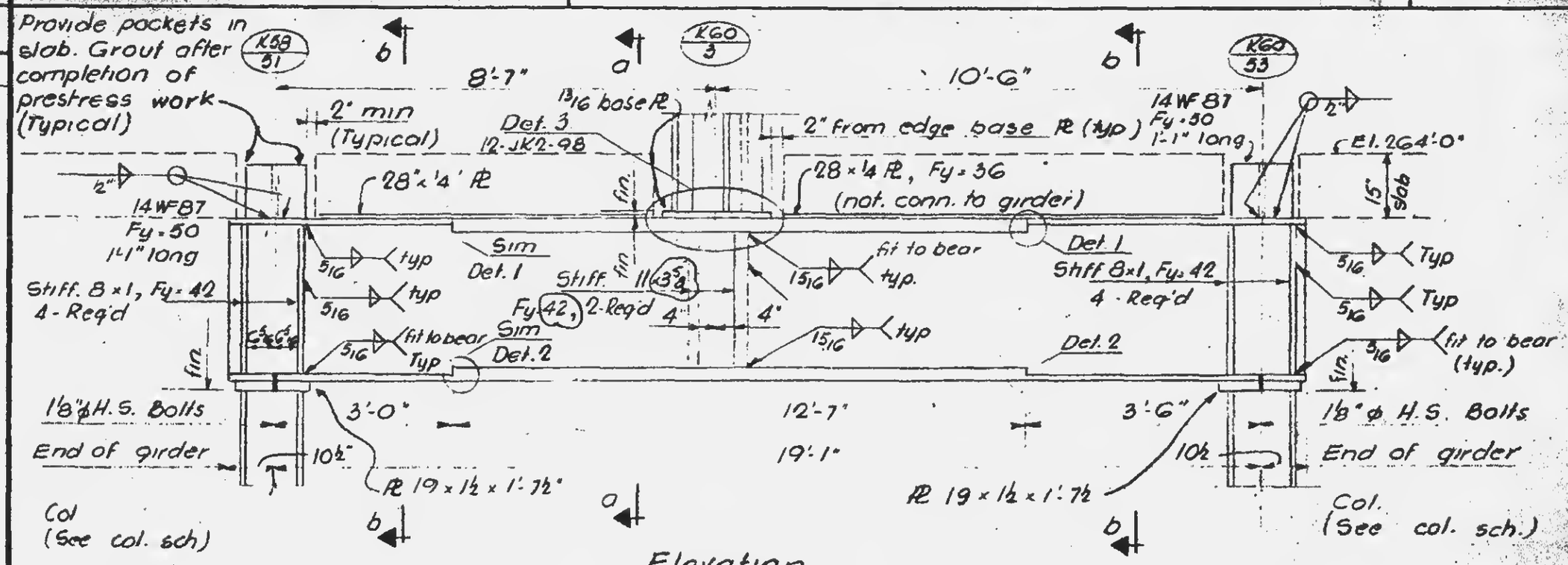
12-JK2-96

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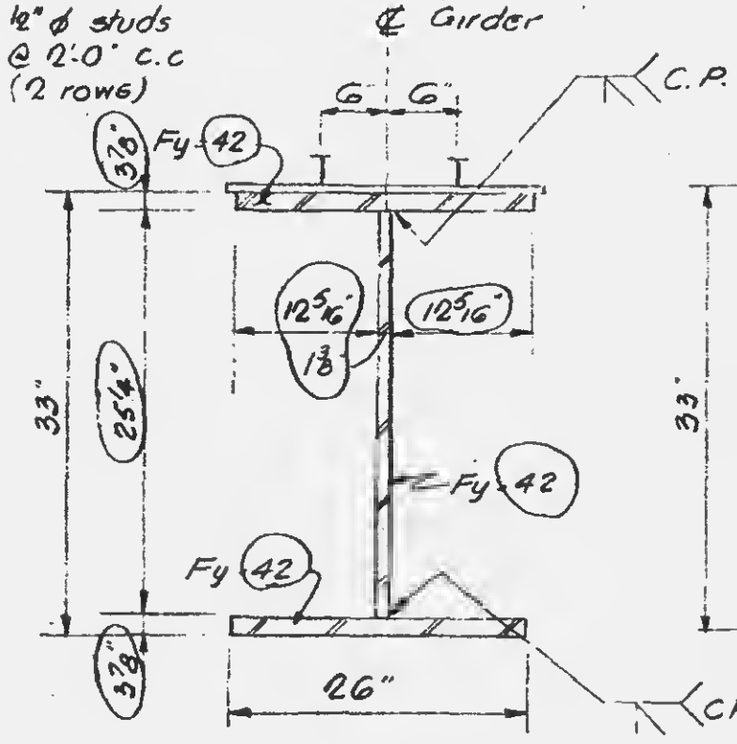
PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 6-11-68

SIONS

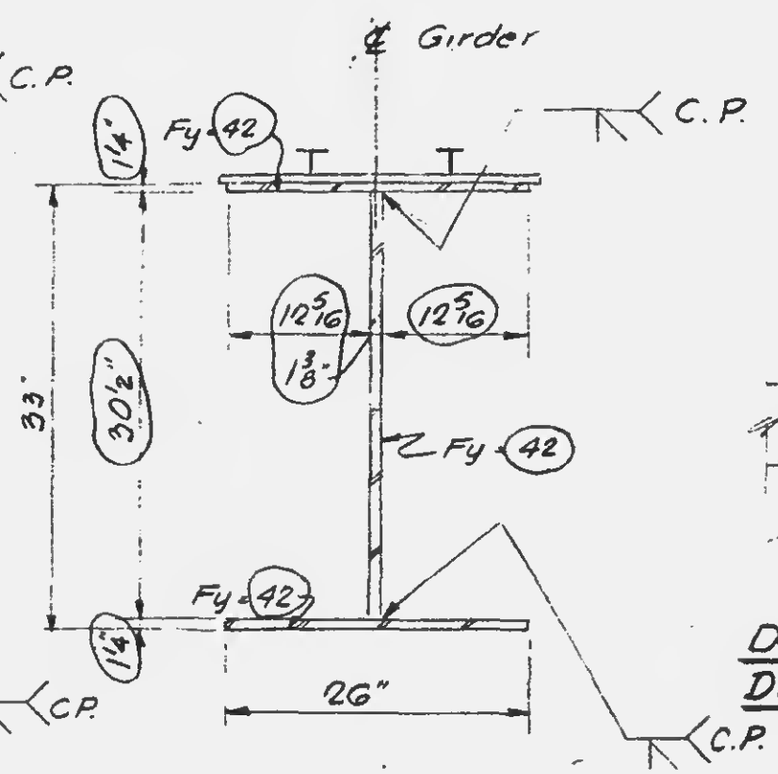
7-19-68



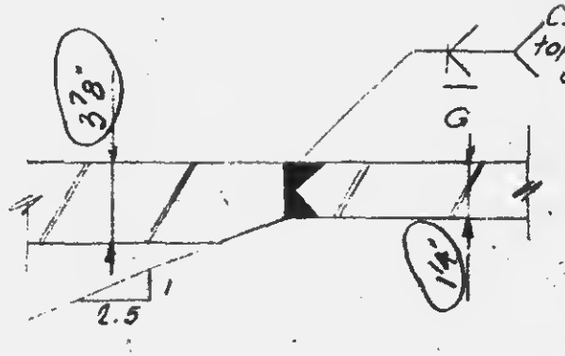
Elevation



Section a-a



Section b-b



Detail 1 (as shown)
Detail 2 (reflected)

Notes

1. All welds to be E 70 xx
2. All bolts to be A 325 friction type, unless noted
3. Col. cap ℄ Detail similar to Detail 104 (10-JK2-7)

12-JK2-97

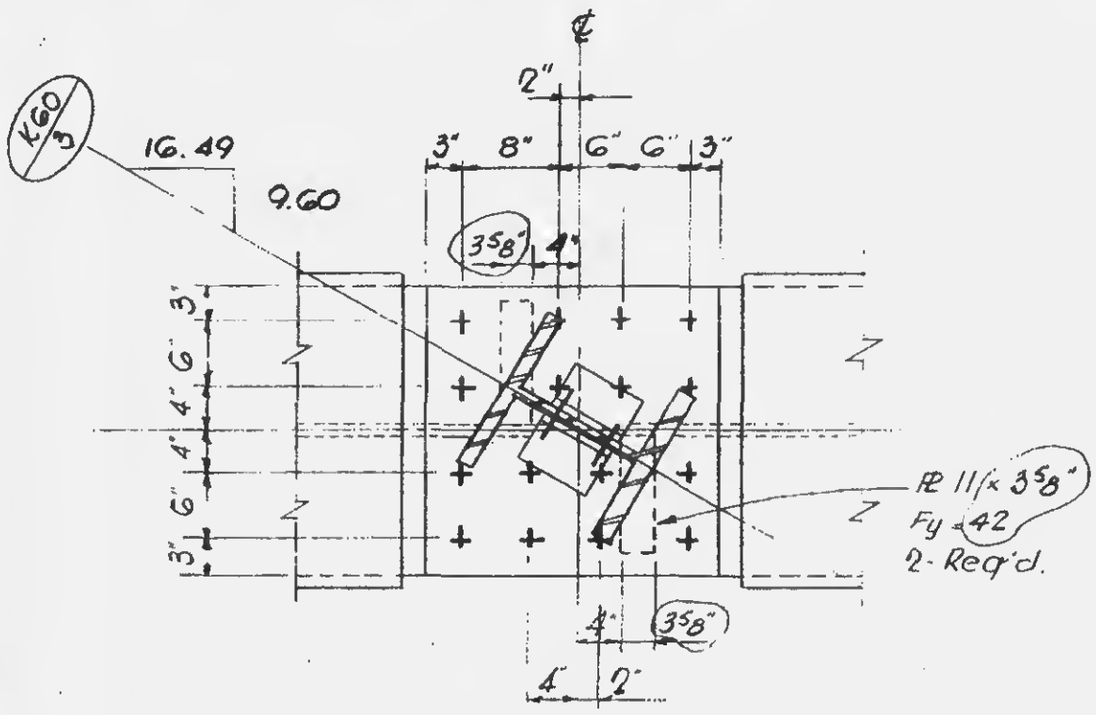
STATE OF NEW YORK No. 34360

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PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 6-11-68

REVISIONS

7-19-68



Detail 3

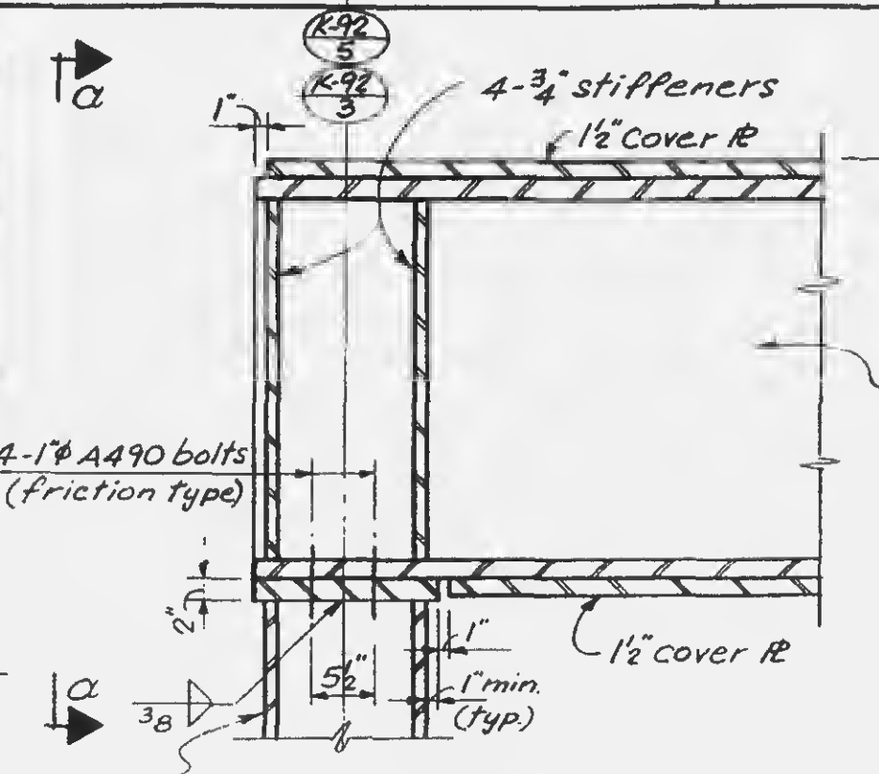
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12-JK2 98

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

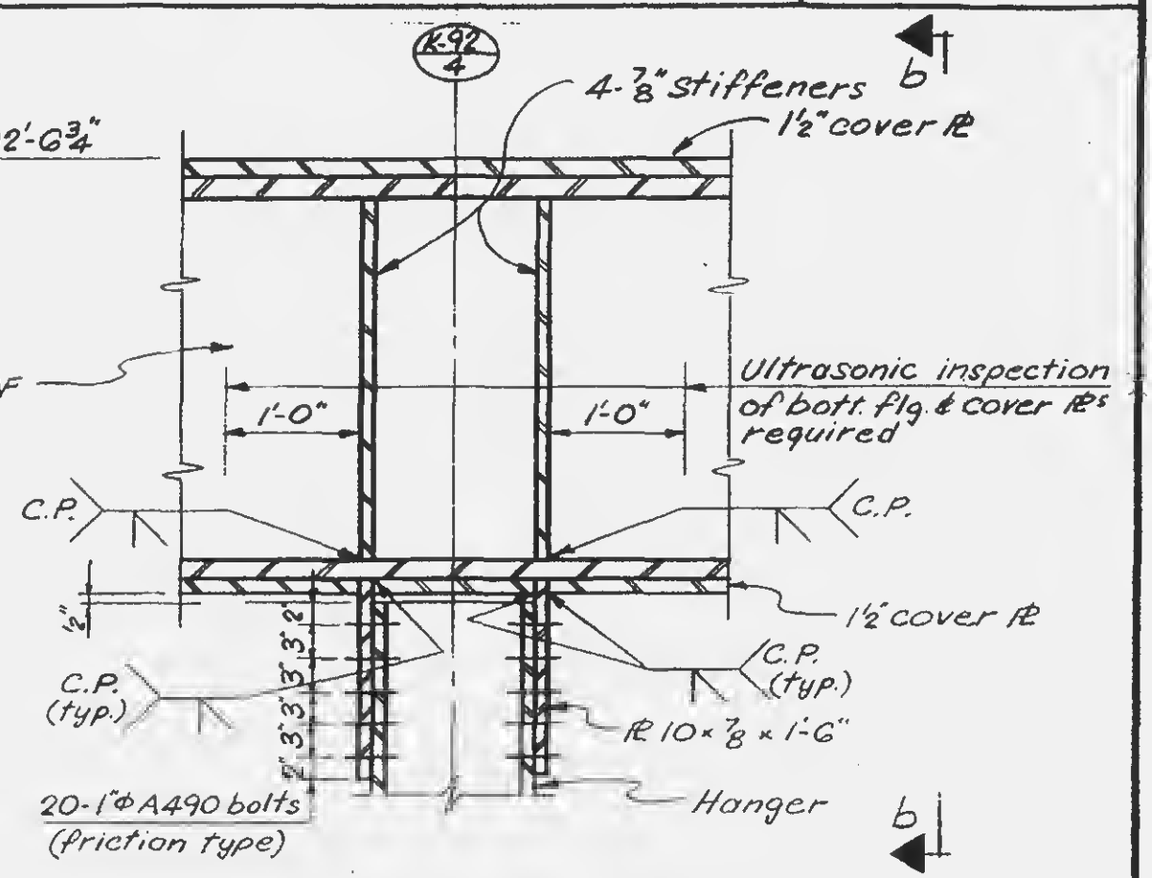
PROJECT THE WORLD TRADE CENTER | TITLE GIRDER DETAILS | DATE 4-18-69

REVISIONS

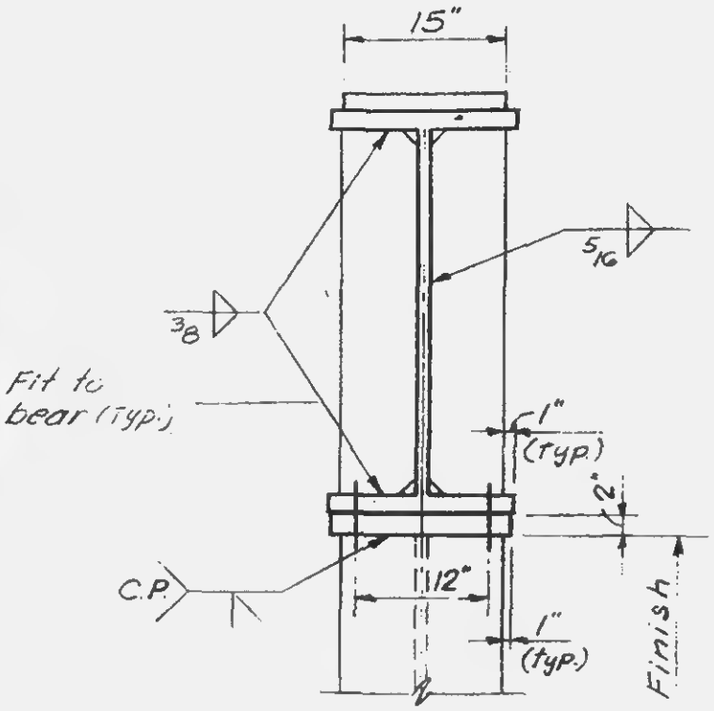


Detail 1

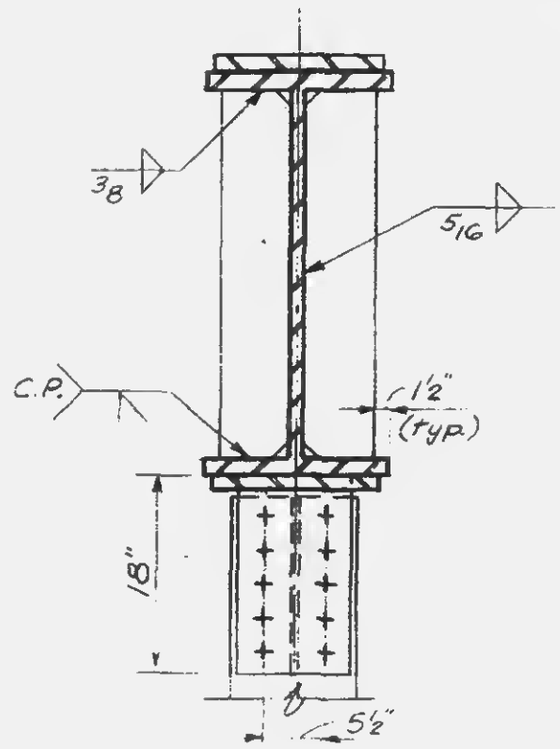
Detail 2 (opp. hand)



Detail 3



Section a-a



Section b-b

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DRAWN S.C.

REVIEWED E.L.

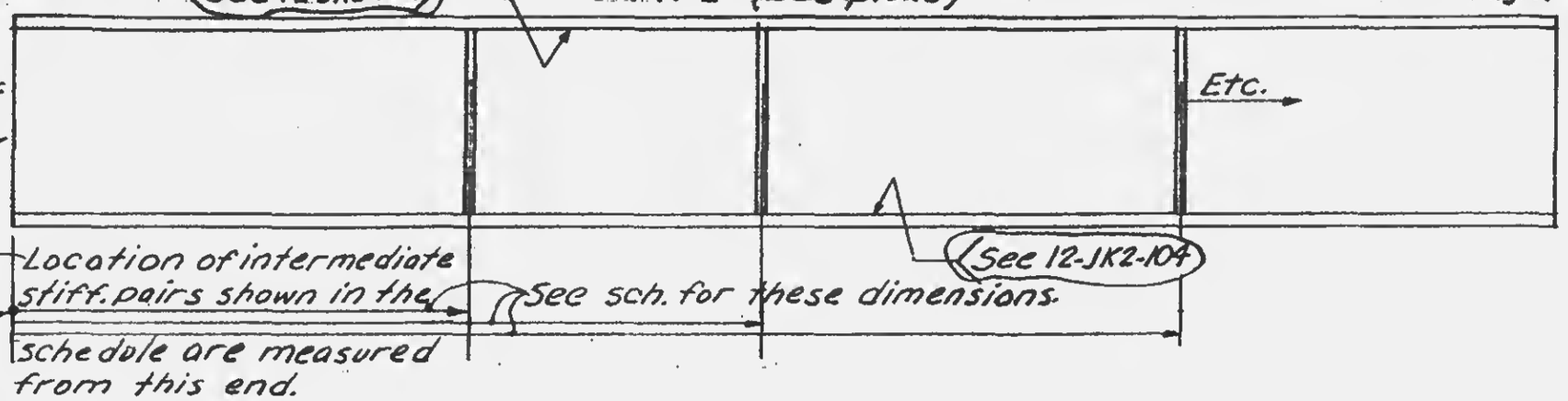
12-JK2-99

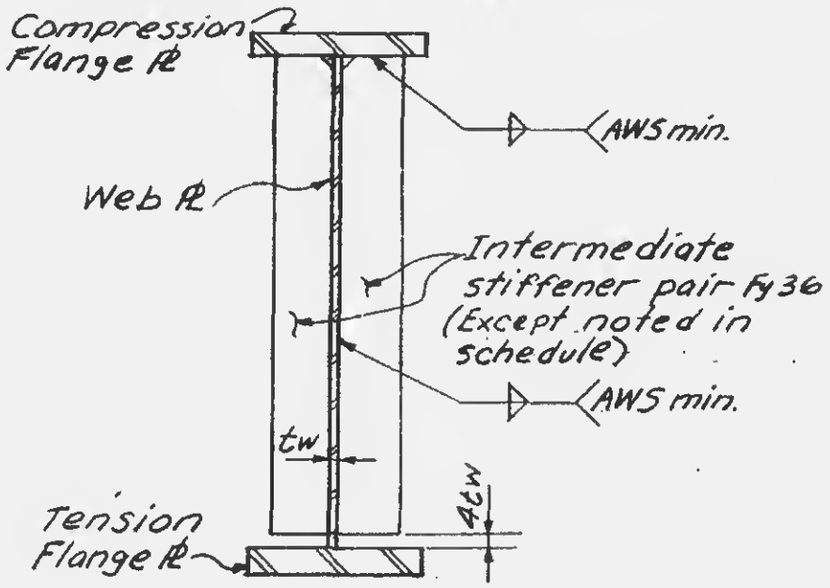
SKILLING · HELLE · CHRISTIANSEN · ROBERTSON — STRUCTURAL ENGINEERS

PROJECT: THE WORLD TRADE CENTER | TITLE: PLATE GIRDER SCHEDULE | DATE: 6-1-68

REVISIONS
6-28-68
7-19-68
11-5-68
1-8-69

Left end:-
1. Extreme end of ℄ Girder, or
2. ℄ of splice pt., or
3. ℄ of beam supporting the ℄ Girder.





Typical Section

NOTES:

1. See 12-JK2-111 and 12-JK2-112 for typical connection details of beams framing to the girder.
2. Connection detail numbers at the base of columns supported by girders are shown on the plans.
3. Bearing stiffeners are shown on the Girder Connection Details and Column Connection Details.
4. Typical information shown on sketches may be altered by the "Remarks" column.

TYPE	Flange ℄s		Web ℄		Intermediate stiffener pairs		Left conn. Det.	Right conn. Det.	Remarks
	Size	Fy	Size	Fy	Size, ea.	Location			
J2A	30"x3"	42	50"x 7/8"	42	6"x 3/8" Fy=42	14', 86', 206' 446', 566' 666'	12-JK2-118	12-JK2-114	
J2B	28"x3	42	50"x 3/4"	42	6"x 3/8" Fy=42	45', 90', 180', 540', 630', 675'	12-JK2-115	12-JK2-116	
					10"x 5/8" Fy=42	360'			

DRAWN A.F.
REVIEWED E.L.

12-JK2-100

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PROJECT THE WORLD TRADE CENTER | TITLE PLATE GIRDER SCHEDULE (CONTINUED) | DATE 5-1-68

REVISIONS
7-19-68
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TYPE	Flange Pls		Web Pl		Intermediate stiffener pairs		Left Conn. Det.	Right conn. Det.	Remarks
	Size	Fy	Size	Fy	Size, ea.	Location			
J2C	44"x5"	42	52"x1 7/8"	42	none	—	12-JK2-117	12-JK2-118	
J2D	34"x5"	42	52"x1 3/8"	42	none	—	12-JK2-115	12-JK2-119	
J4A	44"x5"	42	52"x1 7/8"	42	none	—	12-JK2-120	12-JK2-117	
J4B	40"x3"	42	56"x1 5/8"	42	none	—	12-JK2-121	12-JK2-122	
J4C	32"x3"	42	48"x 5/8"	42	6"x 3/8" Fy=42	63";113";163";243";339";435";535";615"	12-JK2-123	12-JK2-124	
J4D		42							See 12-JK2-105
J4E	22"x3"	42	48"x1 1/4"	42	none	—	12-JK2-127	12-JK2-113 (Type B with A490 bolts)	
J4F	34x2 1/2"	42	49x1 5/8"	42	none	—	12-JK2-128	12-JK2-113 (Type C with A490 bolts)	
J4G	34"x2 1/2"	42	49x1 5/8"	42	none	—	12-JK2-129	12-JK2-128 (Opp. hand)	
J4H	24"x2 1/2"	42	51"x 7/8"	42	none	—	12-JK2-157	12-JK2-113 (Type D with A490 bolts)	
J4I	24"x2 1/2"	42	51"x 7/8"	42	none	—	12-JK2-129	12-JK2-128 (Opp. Hand)	
J4J	22"x2"	42	52"x 3/4"	42	6"x 3/8" Fy=42 10"x 5/8" Fy=42	90", 375" 204", 261"	12-JK2-133	12-JK2-129	"A"
J4K	22"x2"	42	52"x 3/4"	42	6"x 3/8" Fy=42 10"x 5/8" Fy=42	18", 360", 470" 132", 250", 408"	12-JK2-113 (Type E with A490 bolts)	12-JK2-113 (Type F with A490 bolts)	
J4L	22"x2"	42	52"x 3/4"	42	6"x 3/8" Fy=42 10"x 5/8" Fy=42	14", 40", 112", 187" 298"	12-JK2-129	12-JK2-128 (Opp. hand)	"A"
J6A	24"x2"	36	52"x 3/4"	36	6"x 3/8" 10"x 5/8"	75", 303", 417" 132", 189"	12-JK2-128	12-JK2-129	"A"
J6B	20x2 3/4"	36	50 1/2"x 3/4"	36	6"x 3/8" 10"x 5/8"	250", 470" 18", 132", 408"	12-JK2-113 (Type E)	12-JK2-113 (Type H)	
J6C	20"x2 3/4"	36	50 1/2"x 3/4"	36	6"x 3/8" 10"x 5/8"	14", 42", 114" 189", 300"	12-JK2-129	12-JK2-134	"A"
J6D	22"x2"	36	52"x 1/2"	36	6"x 3/8" 10"x 5/8"	126", 183", 297", 326", 395", 436" 69", 240"	12-JK2-128	12-JK2-129	"A"
J6E	22"x2"	36	52"x 1/2"	36	6"x 3/8" 10"x 5/8"	18", 75", 132", 415", 470" 250", 360"	12-JK2-113 (Type G)	12-JK2-113 (Type G)	
J6F	22"x2"	36	52"x 1/2"	36	6"x 3/8" 10"x 5/8"	14", 55", 151", 318" 207"	12-JK2-129	12-JK2-130	"A"
J6G	26"x2"	36	52"x 3/4"	36	6"x 3/8" 10"x 5/8"	75", 189", 303", 401", 442" 246"	12-JK2-128	12-JK2-129	"A"

See 12-JK2-100 for sketches and General notes.

"A" - Intermediate stiffeners to be welded to both top & bottom flanges. (A.W.S. min. welds)

12-JK2-101

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REVISIONS
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11-5-68
1-20-69

TYPE	Flange Pls Size	Fy	Web Pl Size	Fy	Intermediate stiffener pairs Size, ea.	Location	Left Conn. Det.	Right Conn. Det.	Remarks
J6H	26"x2½"	36	51"x¾"	36	6"x⅜"	18"; 75"; 360"; 525"	12-JK2-113 (Type E)	12-JK2-128 (Opp hand)	
					10"x⅝"	132"; 250"; 470"			
J6I	20"x1¾"	36	52½"x¾"	36	6"x⅜"	75"; 246"; 303"; 406"	12-JK2-128	12-JK2-129	"A"
					10"x⅝"	132"			
J6J	20"x1¾"	36	52½"x¾"	36	6"x⅜"	14"; 168"; 286"; 506"	12-JK2-113 (Type F)	12-JK2-113 (Type G)	
					10"x⅝"	54"; 396"			
J6K	20"x1¾"	36	52½"x¾"	36	6"x⅜"	14"; 55"; 207"; 318"	12-JK2-129	12-JK2-130	"A"
J6L	24"x1¾"	36	52½"x⅝"	36	6"x⅜"	132"; 303"; 401", 442"	12-JK2-128A	12-JK2-129	"A"
					10"x⅝"	246"			
J6M	24"x1¾"	36	52½"x⅝"	36	6"x⅜"	132"; 470"	12-JK2-113 (Type G)	12-JK2-113 (Type G)	
					10"x⅝"	18"; 250"; 360"			
J6N	24"x1¾"	36	52½"x⅝"	36	6"x⅜"	14"; 49"; 139"; 306"	12-JK2-129	12-JK2-130	"A"
					10"x⅝"	183 1/16			
J6O	26"x4"	36	48"x1⅜"	36	None	—	12-JK2-134	12-JK2-130	
J6P	26"x4	36	48"x1⅜"	36	None	—	12-JK2-113 (Type J)	12-JK2-113 (Type J)	
J6Q	26"x4"	36	48"x1⅜"	36	None	—	12-JK2-130	12-JK2-130	
J2E	20"x2½"	42	45"x¾"	42	8"x½" Fy=42	38.5", 72.5", 134.5", 168.5", 253.5", 301.5"	12-JK2-131	12-JK2-132	SEE 12-JK2-106 FOR BRACING DETAIL
					8"x1" Fy=42	50.5", 60.5", 146.5", 156.5"			
J2F	28"x2¾"	42	50½"x1"	42	None		12-JK2-135	12-JK2-119A	FL=10"x3" from N5166.50 to North end. See 12-JK2-118A for detail of hanger at J3-13
J2G	22"x2"	42	52"x¾"	42	10"x⅜"	132", 252"	12-JK2-121	12-JK2-116	
J2H	26"x2½"	36	65"x1"	36	None		12-JK2-128	12-JK2-136	Bm. conn @ both ends 12-JK2-113 type K
J2I	22x2½"	36	65"x¾"	36	6"x⅜"	116", 296"	12-JK2-137	12-JK2-128	Col. conn. 12-JK2-148. Bm. conn @ both ends 12-JK2-113 type L
J4M	16"x1½"	36	44"x½"	36	None		190 kips	190 kips	
J4N	22"x2"	36	66"x¾"	36	None		338 kips.	12-JK2-138	Col. conn. 12-JK2-148
J2J	24"x2"	42	52"x¾"	42	10"x⅜"	96", 186", 276", 366", 456"	12-JK2-116	12-JK2-121	

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DRAWN S.C.

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See 12-JK2-100 For sketches and General notes.

Where connection reaction in kips are given, use standard AISC connection.
"A" - Intermediate stiffeners to be welded to both top & bottom flanges. (A.W.S. min. welds)

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE PLATE GIRDER SCHEDULE (CONTINUED) | DATE 6-7-68

REVISIONS
9-4-68
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3-17-69

TYPE	Flange PL's Size	Fy	Web PL Size	Fy	Intermediate Stiffener Pairs Size Ea.	Location	Left Conn. Det.	Right Conn. Det	Remarks
K2A	24"x 2"	36	52"x 3/4"	36	6"x 5/8"	78", 318", 410", 448"	12-JK2-128	12-JK2-129	"A"
					10"x 5/8"	138", 198", 258",			
K2B	24"x 2"	36	52"x 3/4"	36	6"x 3/8"	87", 429",	12-JK2-113 (TYPE E)	12-JK2-113 (TYPE E)	-
					10"x 5/8"	30", 144", 258", 372", 486"			
K2C	24"x 2"	36	52"x 3/4"	36	6"x 3/8"	14", 52", 132", 364"	12-JK2-129	12 JK2-128 (OPP. HAND)	"A"
					10"x 5/8"	210", 304"			
K2D	24"x 2"	36	52"x 3/4"	36	6"x 3/8"	78", 238", 318", 436",	12-JK2-141	12-JK2-129	"A"
					10"x 5/8"	138",			
K2E	24"x 2"	36	52"x 3/4	36	6"x 3/8"	99", 441"	12-JK2-113 (TYPE H)	12-JK2-113 (TYPE E)	
					10"x 5/8"	42", 156", 270", 384", 498"			
K2F	24"x 2"	36	52"x 3/4"	36	6"x 3/8"	14", 52", 132", 364"	12-JK2-129	12-JK2-128 (OPP HAND)	"A"
					10"x 5/8"	210", 304"			
K2G	26"x 2"	36	52"x 3/4"	36	6"x 3/8"	78", 318", 414", 460",	12-JK2-149	12-JK2-129	"A"
					10"x 5/8"	138" 258"			
K2H	26"x 2 1/2"	36	51"x 3/4"	36	6"x 3/8"	75", 417",	12-JK2-113 (TYPE E)	12-JK2-113 (TYPE E)	
					10"x 5/8"	18", 132", 246", 360", 474",			
K2I	26"x 2"	36	52"x 3/4	36	6"x 3/8"	14", 60", 162", 294", 360",	12-JK2-139	12-JK2-140	"A"
					10"x 5/8"	206",			
K2J	28"x 3 1/4"	36	49 1/2"x 7/8"	36	8"x 1/2"	90", 234", 522",	12-JK2-140	12-JK2-113 (TYPE M)	
					10"x 5/8"	162", 306", 378", 450",			
K2K	26"x 2 1/2"	36	51"x 7/8"	36	8"x 1/2"	18", 126",	12-JK2-129	12-JK2-133	"A"
					10"x 5/8"	198", 450",			
K2L	24"x 2 1/2"	36	51"x 3/4"	36	6"x 3/8"	48", 120", 276", 420", 468	12-JK2-139	12-JK2-113 (TYPE E)	
					10"x 5/8"	192", 360",			
K2M	24"x 2 1/2"	36	51"x 3/4"	36	6"x 3/8"	18", 66", 174", 318", 402", 534",	12-JK2-129	12-JK2-128 (OPP. HAND)	"A"
					10"x 5/8"	234", 486",			
J4P	22"x 3"	42	50"x 3/4"	42	6"x 3/8"	402"	12-JK2-121A	12-JK1-35	
J4Q	20"x 3"	42	50"x 3/4"	42	6"x 3/8"	390"	12-JK2-145	12-JK2-121	
K5A	26"x 3 1/2"	42	53"x 3/4"	42	6"x 3/8"	270", 390"	12-JK2-121	12-JK2-147	see 12-JK2-146 for Hanger at KGI-5.

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DRAWN S.C
REVIEWED E.L.

See 12-JK2-100 FOR SKETCHES AND GENERAL NOTES.

"A" - INTERMEDIATE STIFFENERS TO BE WELDED TO BOTH TOP & BOTTOM FLANGES. (A.W.S. MIN)

12-JK2-103

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

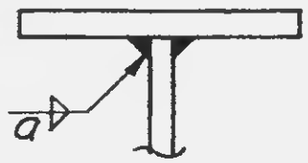
PROJECT: THE WORLD TRADE CENTER | TITLE: PLATE GIRDER WELDING SCHEDULE | DATE: 1-8-69

REVISIONS

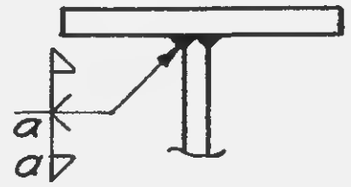
GIRDER TYPE	WELD DETAIL	WELD a
J2A	1	1/2
J2B	1	1/2
J2C	2	7/8
J2D	3	
J2E	*1	1/2
J2F	2	5/8
J2G	1	3/8
J2H	1	1/2
J2I	1	1/2
J2J	1	1/2
J4A	3	
J4B	2	3/4
J4C	1	1/2
J4D	See 12-JK2-105	
J4E	3	
J4F	2	3/4
J4G	2	3/4
J4H	1	5/8
J4I	1	5/8

GIRDER TYPE	WELD DETAIL	WELD a
J4J	1	1/2
J4K	1	5/8
J4L	1	5/8
J4M	1	3/8
J4N	1	3/8
J4P	1	1/2
J4Q	1	5/8
J6A	1	3/8
J6B	1	1/2
J6C	1	1/2
J6D	1	3/8
J6E	1	3/8
J6F	1	3/8
J6G	1	3/8
J6H	1	1/2
J6I	1	3/8
J6J	1	3/8
J6K	1	3/8
J6L	1	3/8

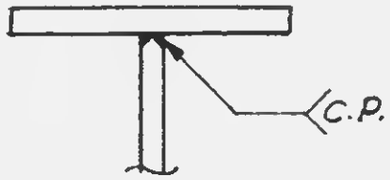
GIRDER TYPE	WELD DETAIL	WELD a
J6M	1	3/8
J6N	1	3/8
J6O	2	5/8
J6P	2	5/8
J6Q	2	1/2
K2A	1	3/8
K2B	1	3/8
K2C	1	3/8
K2D	1	1/2
K2E	1	1/2
K2F	1	3/8
K2G	1	3/8
K2H	1	1/2
K2I	1	3/8
K2J	1	5/8
K2K	1	1/2
K2L	1	1/2
K2M	1	1/2
K5A	1	1/2



WELD DETAIL 1



WELD DETAIL 2



WELD DETAIL 3

NOTES:

1. Welding Electrodes to be E70XX.
2. This schedule is intended to show typical web-flange welding. Welds shown in detail on 12JK2-105 to 158 shall apply for portion of girder shown.
3. Where column bears on girder from above or below, fit web to bear on loaded flange for length of 2'-0", unless weld detail 3 is called for. Complete penetration weld may be used as an option to fitting of web.
4. * — Complete penetration weld between web & top flange thru-out.

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DESIGNED

DRAWN S.T.M.

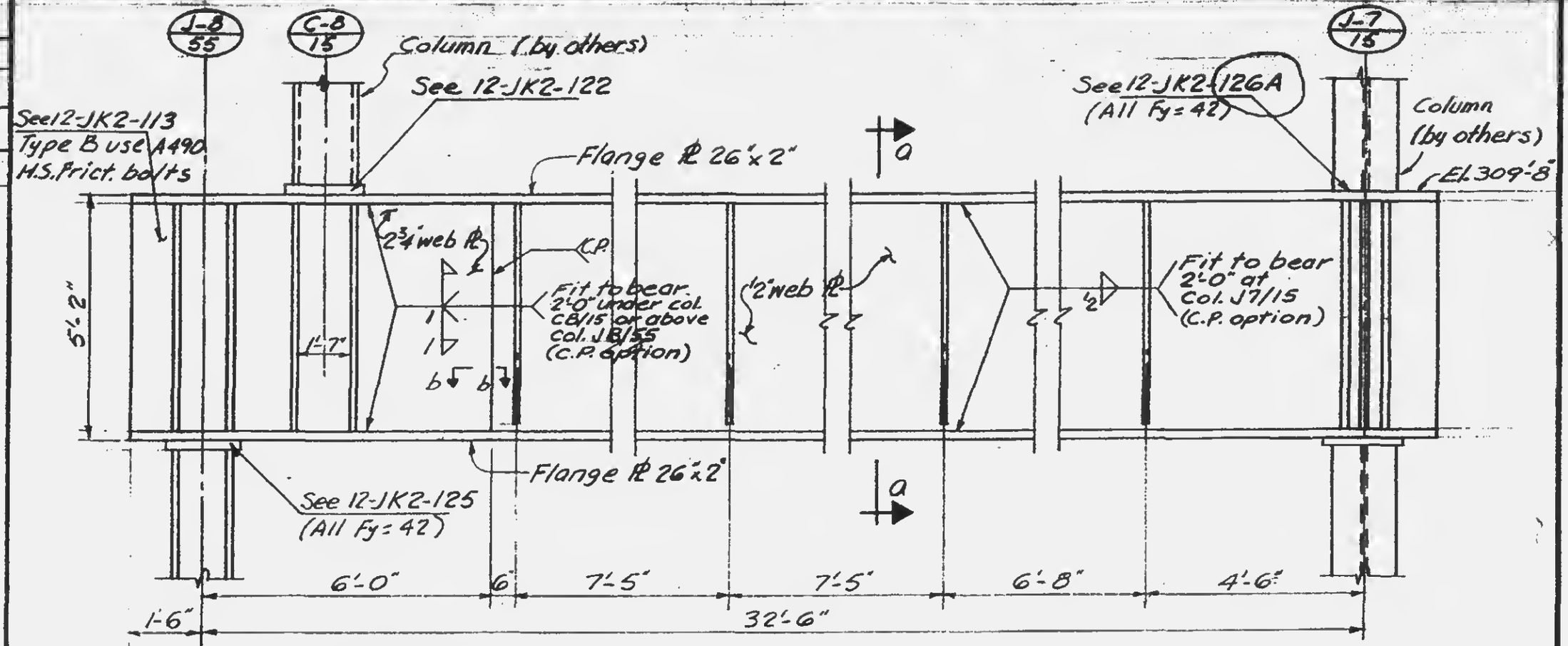
REVIEWED F.I.

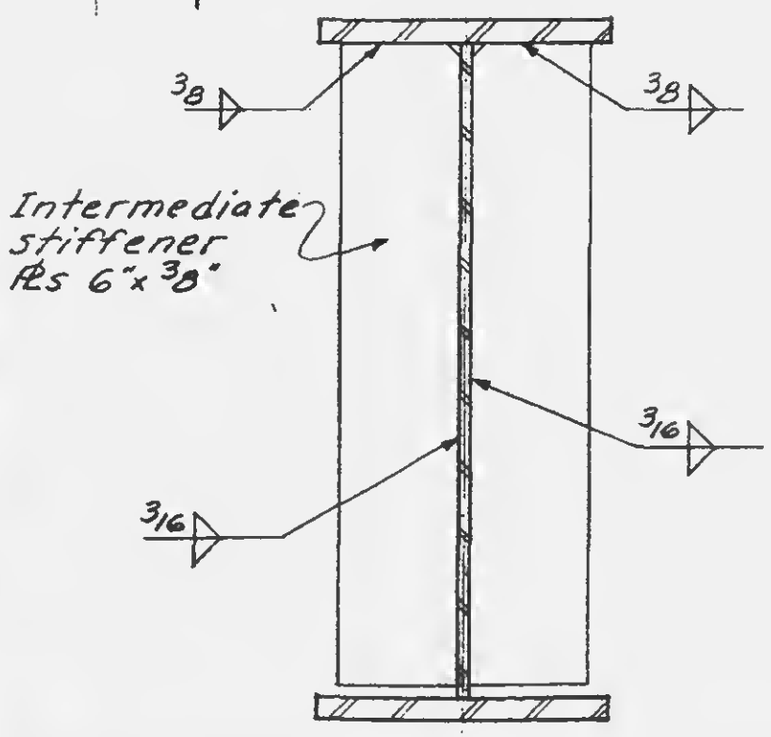
12-JK2-104

SKIDMORE, OWINGS & MERRILL — CHRISTIANSEN — ROBERTSON

PROJECT THE WORLD TRADE CENTER | TITLE PLATE GIRDER J-7/8 | DATE 5-21-68

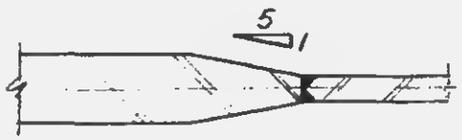
REVISIONS
7-19-68
12-3-68
1-8-69
1-20-69





Section a-a

Note:
1. All material with Fy=42 except as noted.



Section b-b

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DRAWN
A.F.

REVIEWED
E.L.

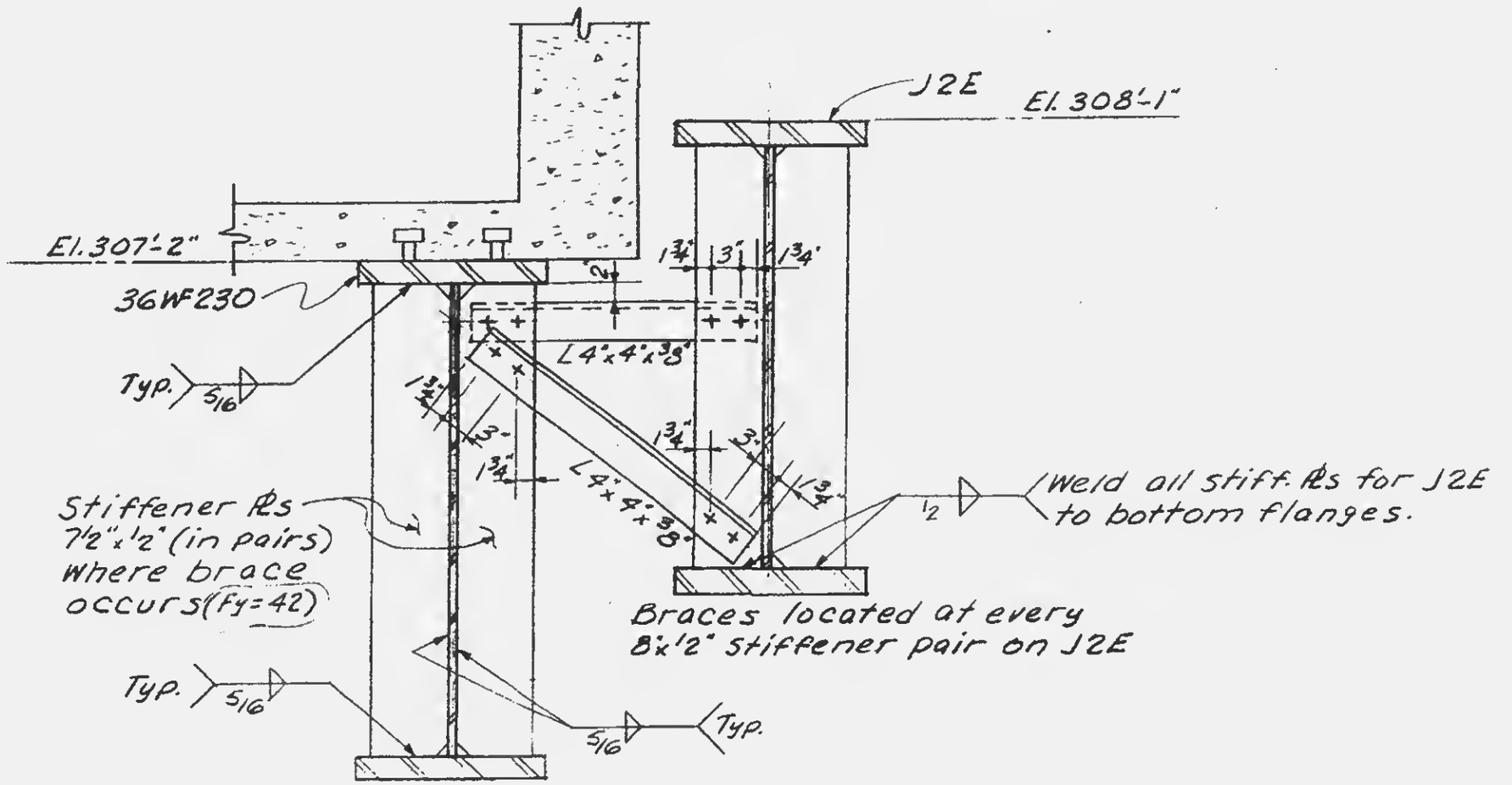
12-JK2-105

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PROJECT THE WORLD TRADE CENTER | TITLE GIRDER BRACING DETAILS | DATE 5-1-68

REVISIONS

7-19-68



Note:
1. Bolts are 1"ϕ A325 H.S. friction type connections.

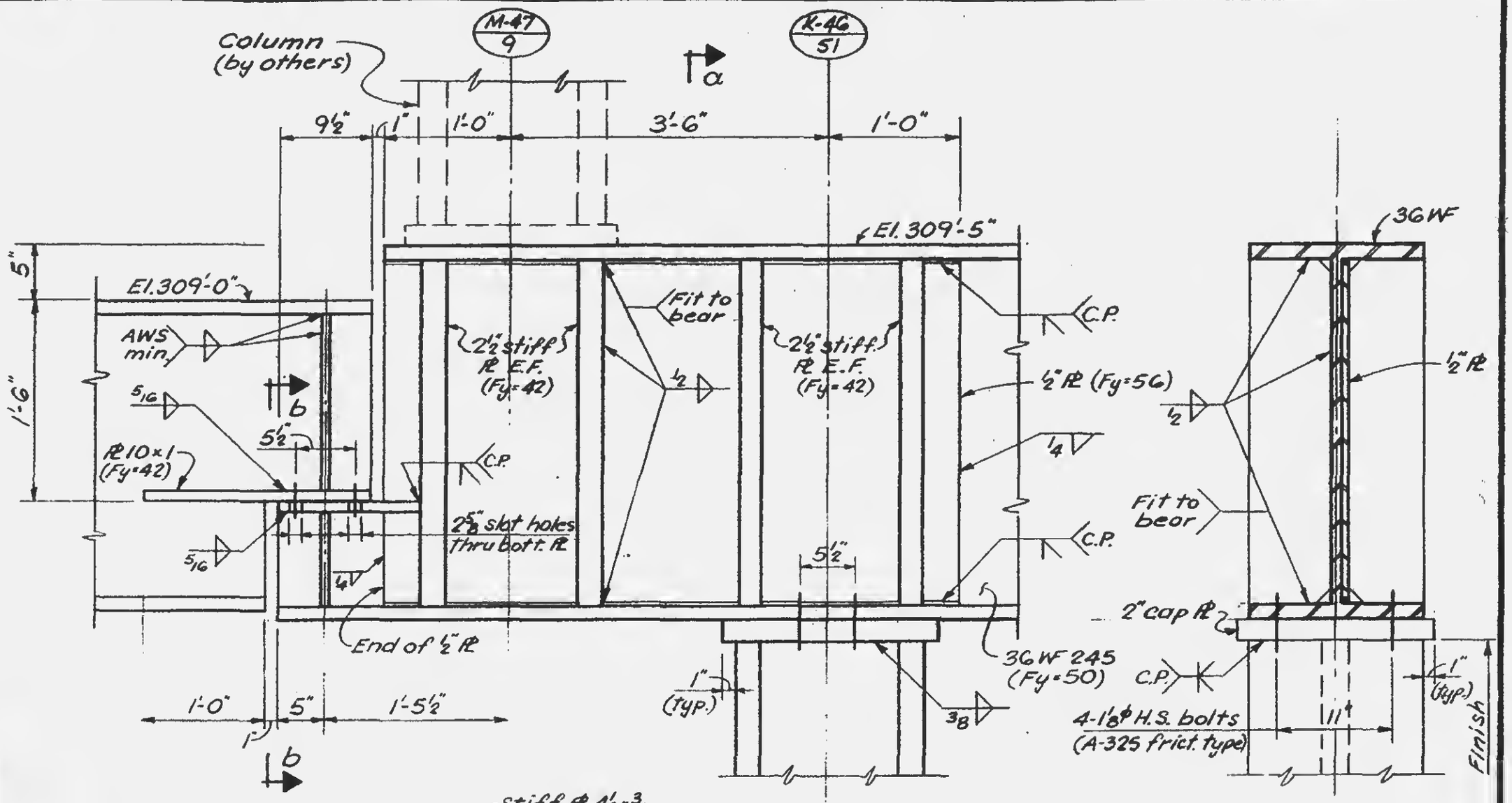


12-JK2-106

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PROJECT THE WORLD TRADE CENTER | TITLE GIRDER DETAILS | DATE 4-30-69

REVISIONS



Section a-a

Section b-b

Notes:
1. All welds to be E70xx.
2. Provide washers 2½ × ⅝ (sq. or round) with Fy=50 ksi for all bolts over slot holes.

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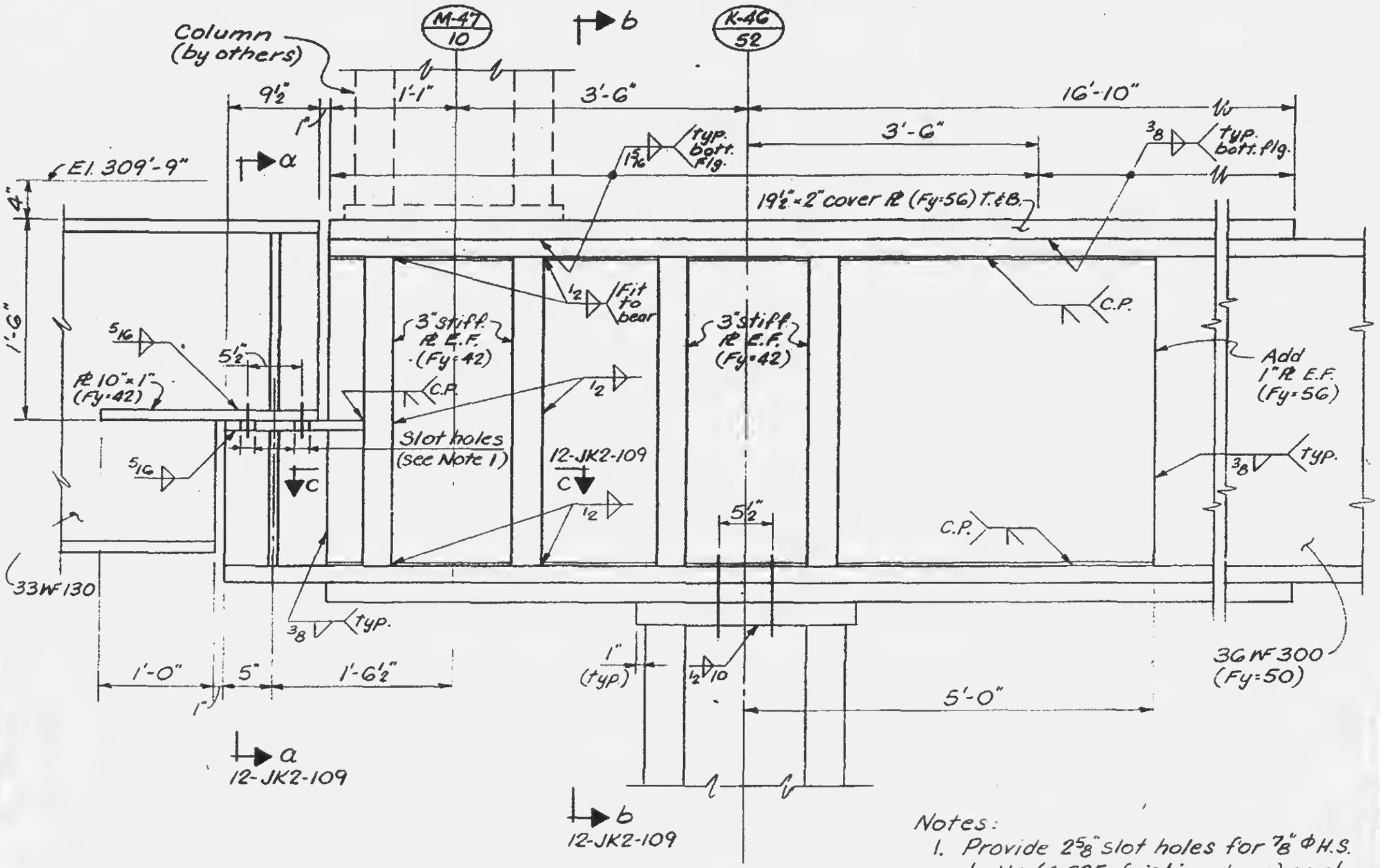
REVIEWED
E.L.

12-JK2-107

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PROJECT: THE WORLD TRADE CENTER | TITLE: GIRDER DETAILS | DATE: 4-30-69

REVISIONS



Notes:

1. Provide $2\frac{5}{8}$" slot holes for $\frac{7}{8}$" Φ H.S. bolts (A-325 friction type) as shown. Tighten bolts after pouring concrete to the strip of const jt. as shown on Plan.
2. All welds to be E70xx.
3. Provide washers $2\frac{1}{2} \times \frac{5}{8}$ (sq. or round) with Fy=50 ksi for all bolts over slot holes.

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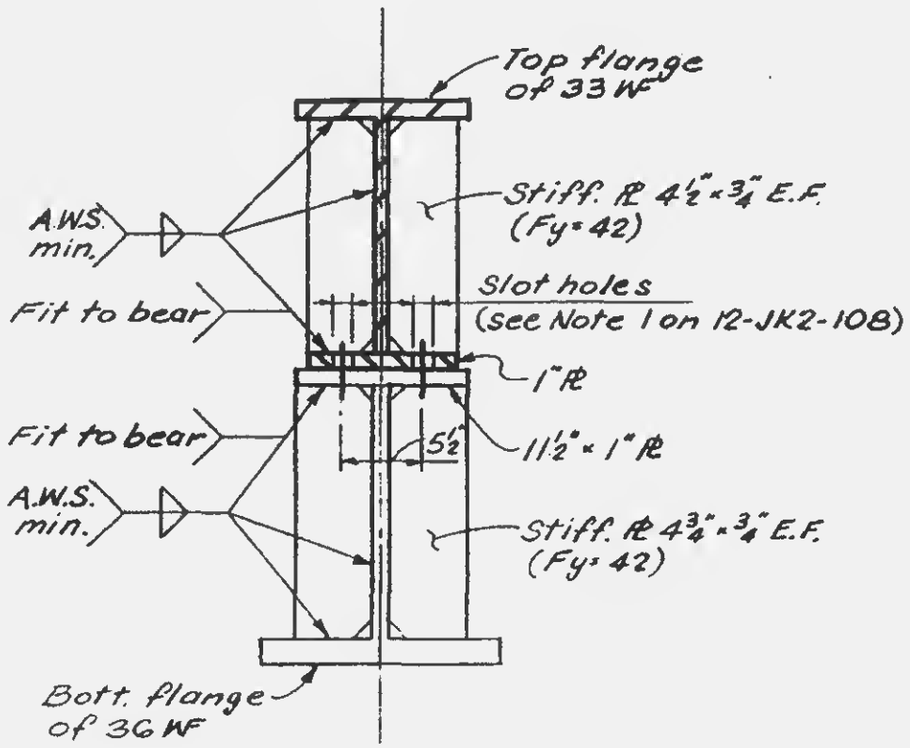
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12-JK2-108

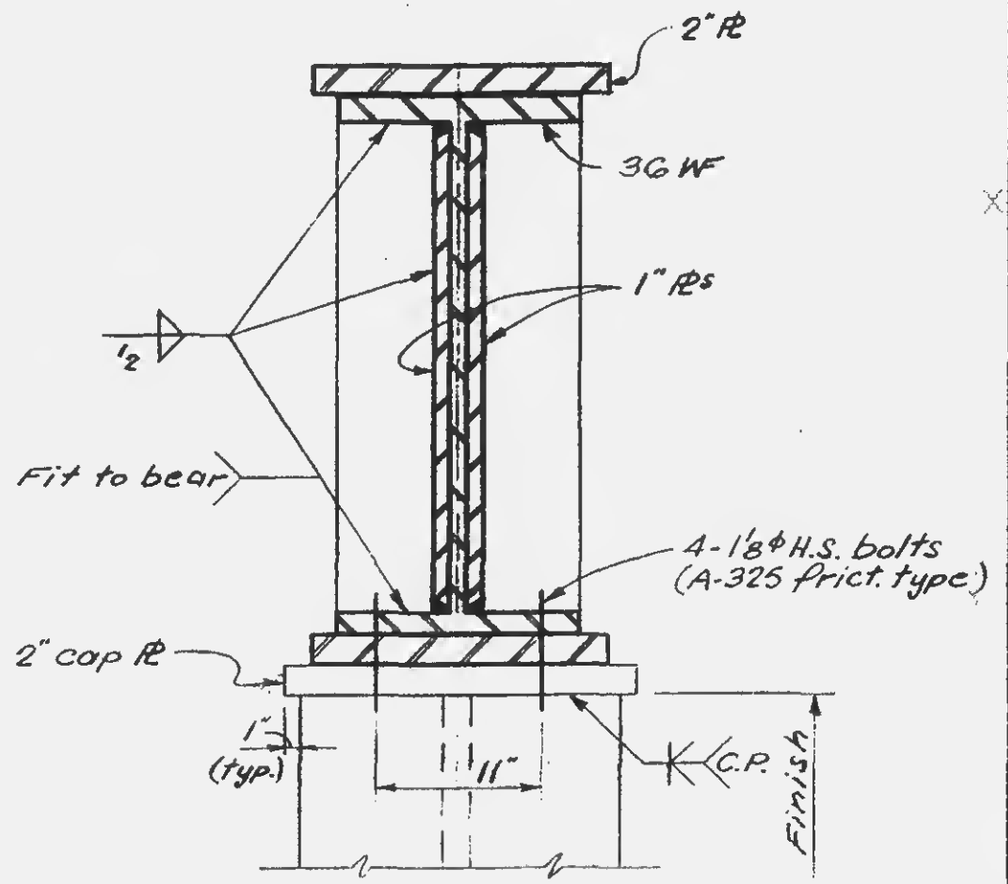
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PROJECT: THE WORLD TRADE CENTER | TITLE: GIRDER DETAILS | DATE: 4-30-69

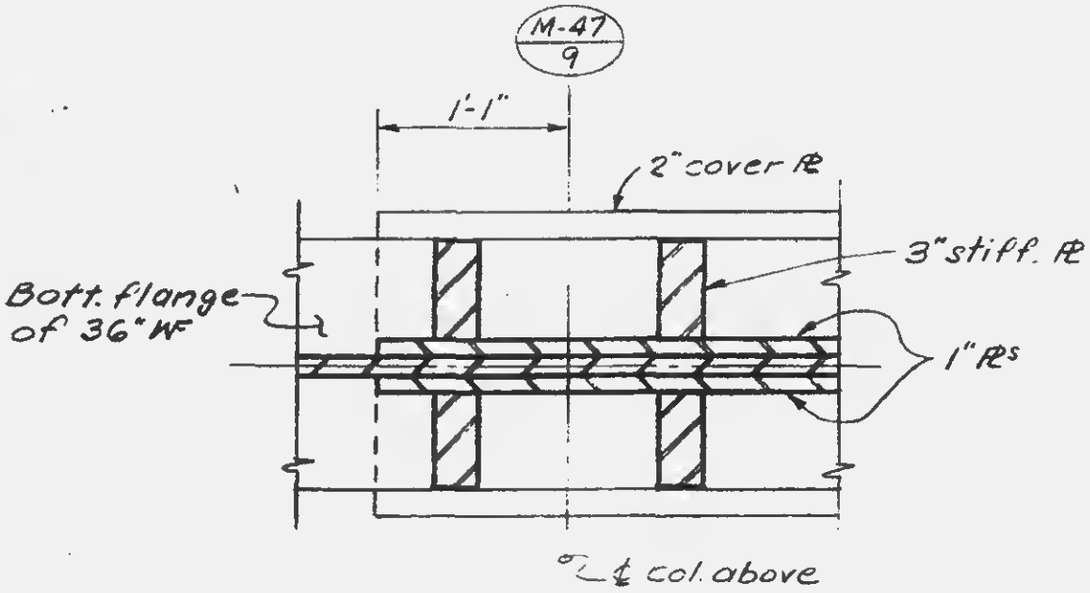
REVISIONS



Section a-a



Section b-b



Section c-c

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DRAWN: S.C.

REVIEWED: E.L.

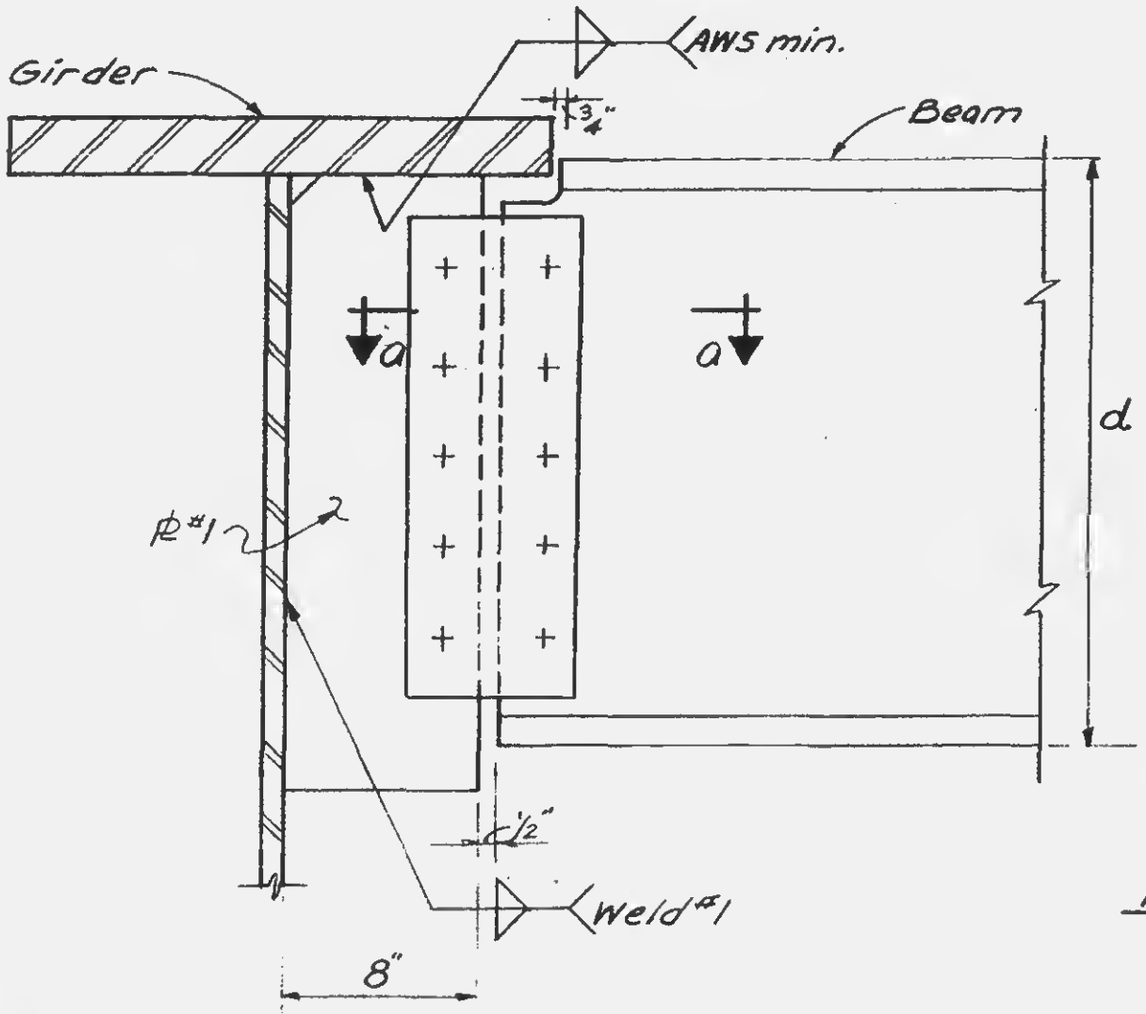
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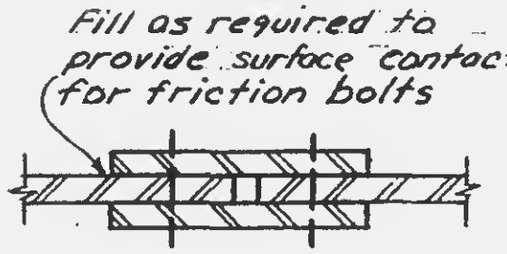
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PROJECT: THE WORLD TRADE CENTER | TITLE: TYPICAL BEAM TO GIRDER CONNECTION | DATE: 5-1-68

REVISIONS
7-19-68

NO STIFFENER AT CONNECTION





Section a-a

NOTES:

1. Use H.S. friction bolts. A325 (A490 for all connections at El. 310 within Zone J-2 & J-4 areas.)
2. Size and number of bolts, shear plate thickness and Weld #1 to be determined by beam reaction. See plans for beam reaction.
3. Forces at the connection are a vertical reaction from the beam (R), and a horizontal force equal to $\frac{16}{d}$ (R)

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12-JK2-111

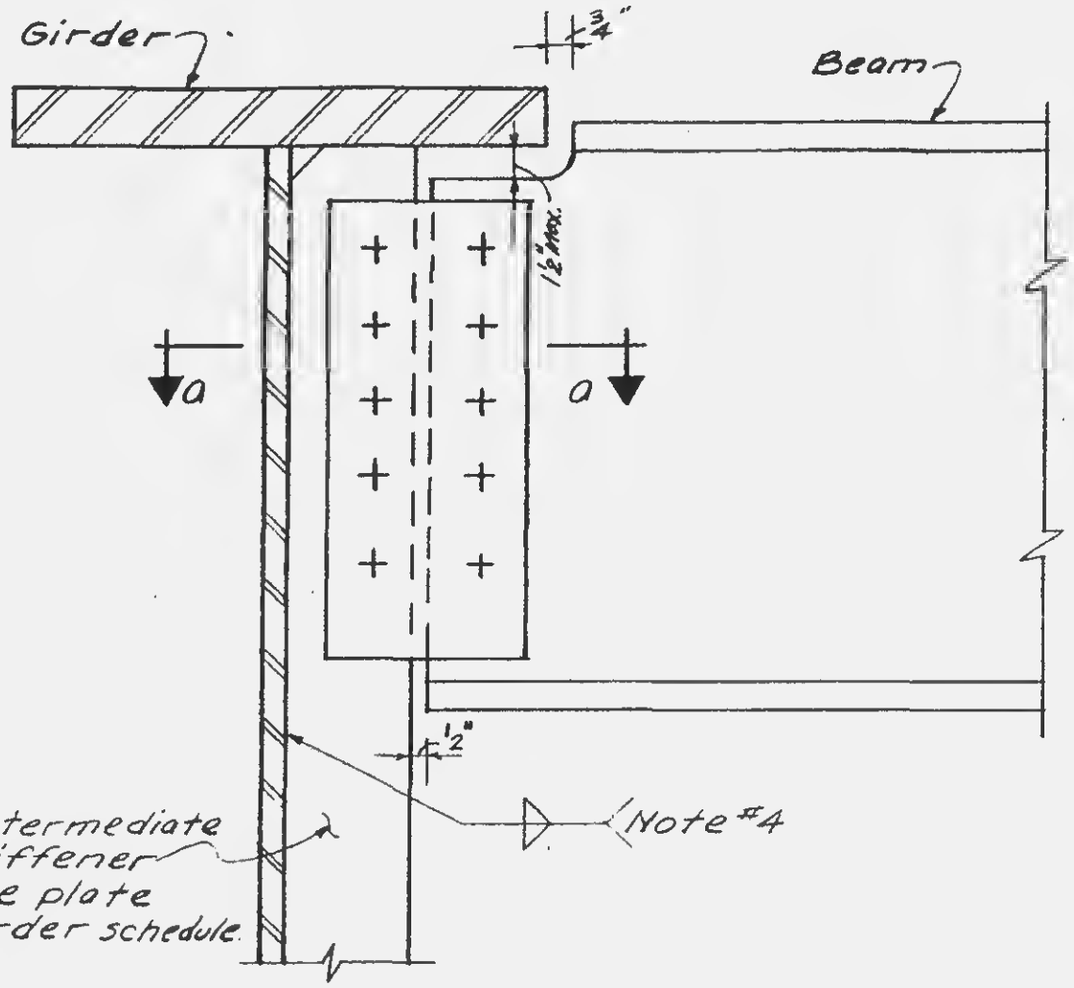
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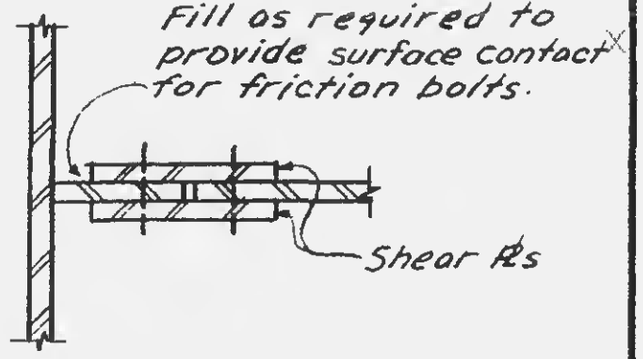
PROJECT THE WORLD TRADE CENTER | TITLE TYPICAL BEAM TO GIRDER CONNECTION | DATE 5-1-68

REVISIONS

7-19-68

CONNECTION AT STIFFENER





Section a-a

NOTES:

1. Use H.S. friction bolts. A325 (A490 bolts for all connections at El. 310 within Zone J-2 & J-4 areas)
2. Size and number of bolts and shear plate thickness to be determined by beam reaction. See plans for beam reaction.
3. Stiffener width and/or thickness may be increased above that shown in the schedule when necessary to improve beam connection.
4. Increase fillet weld above AWS min. when required by beam reaction.

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12-JK2-112

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PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-68

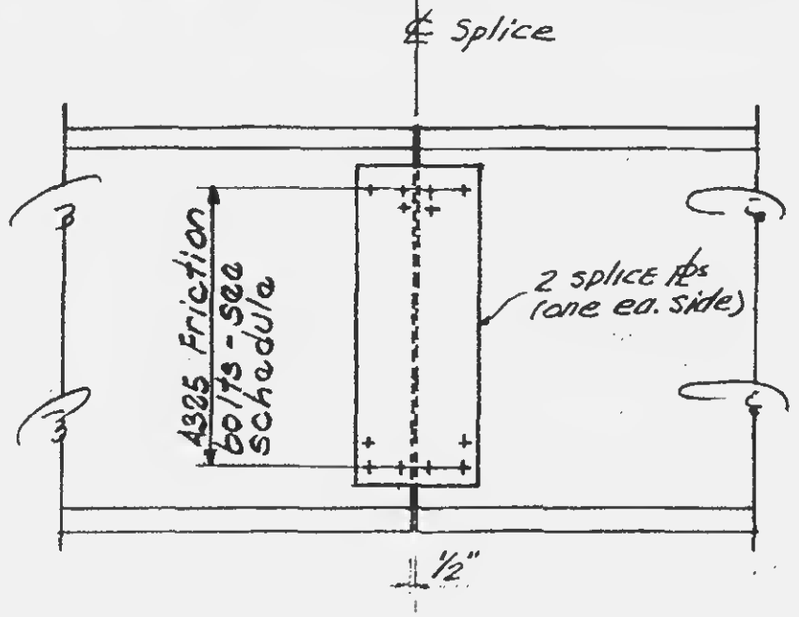
REVISIONS

6-7-68

7-19-68

See plans for location

Stiffener locations measured from ℄ of splice



SCHEDULE		
Type	Total No. of Bolts	Splice Plate Thickness
A	24 - 1⅛" ϕ	⅜"
B	36 - 1" ϕ	½"
C	78 - 1⅛" ϕ	13/16"
D	56 - 1" ϕ	⅝"
E	44 - 1" ϕ	⅝"
F	48 - 1" ϕ	⅝"
G	40 - 1" ϕ	½"
H	52 - 1" ϕ	9/16"
J	72 - 1⅛" ϕ	⅞"
K	12 - ¾" ϕ	¼"
L	20 - 1" ϕ	⅜"
M	48 - 1⅛" ϕ	½"

Notes:

1. Splice plates are Fy42.
2. If joining webs are unequal in thickness fill plates are required. Insure surface contact for friction bolts.

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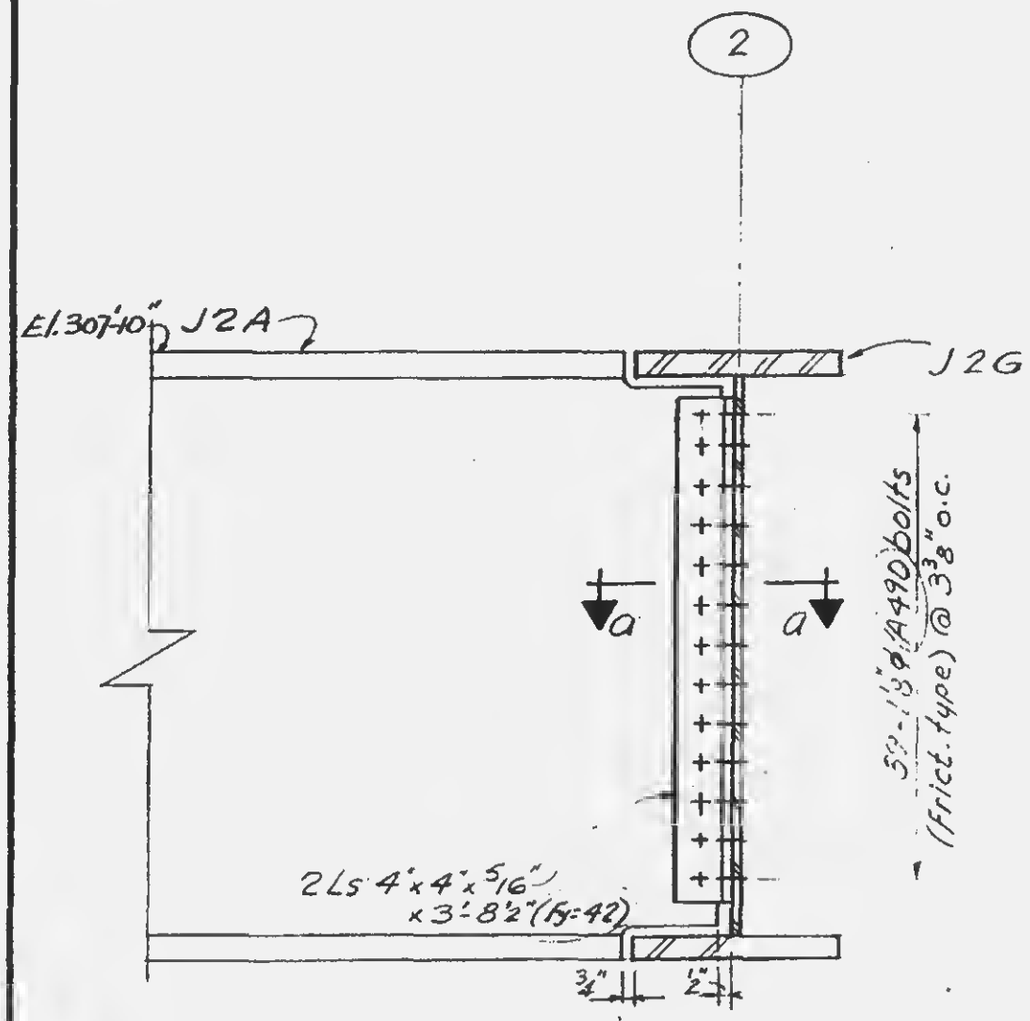
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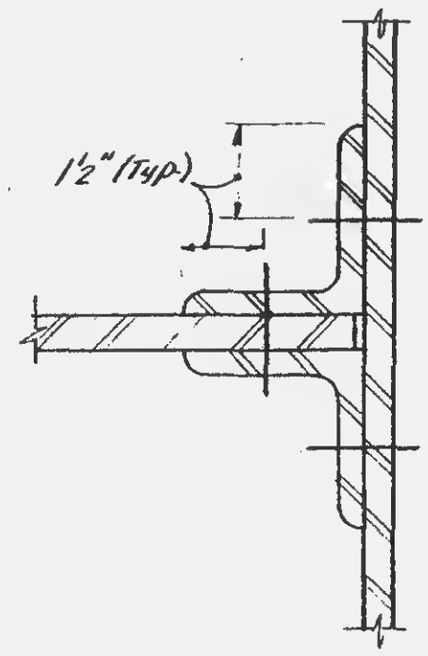
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PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-68

REVISIONS

7-19-68





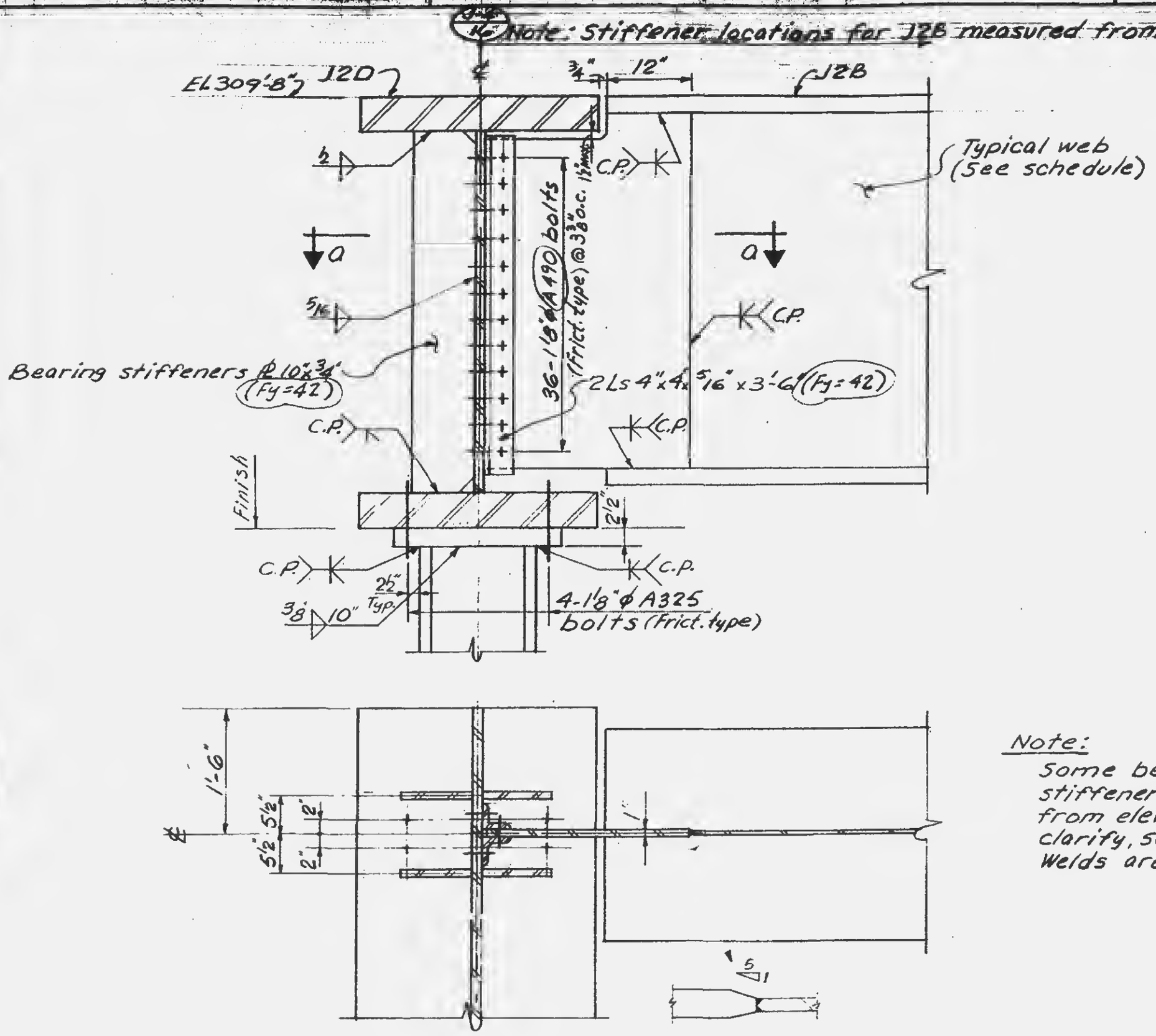
Section a-a

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12-JK2-114

REVISIONS

7-19-68



Section a-a

Note:
Some bearing stiffeners omitted from elevation for clarity, see section a-a. Welds are typical.

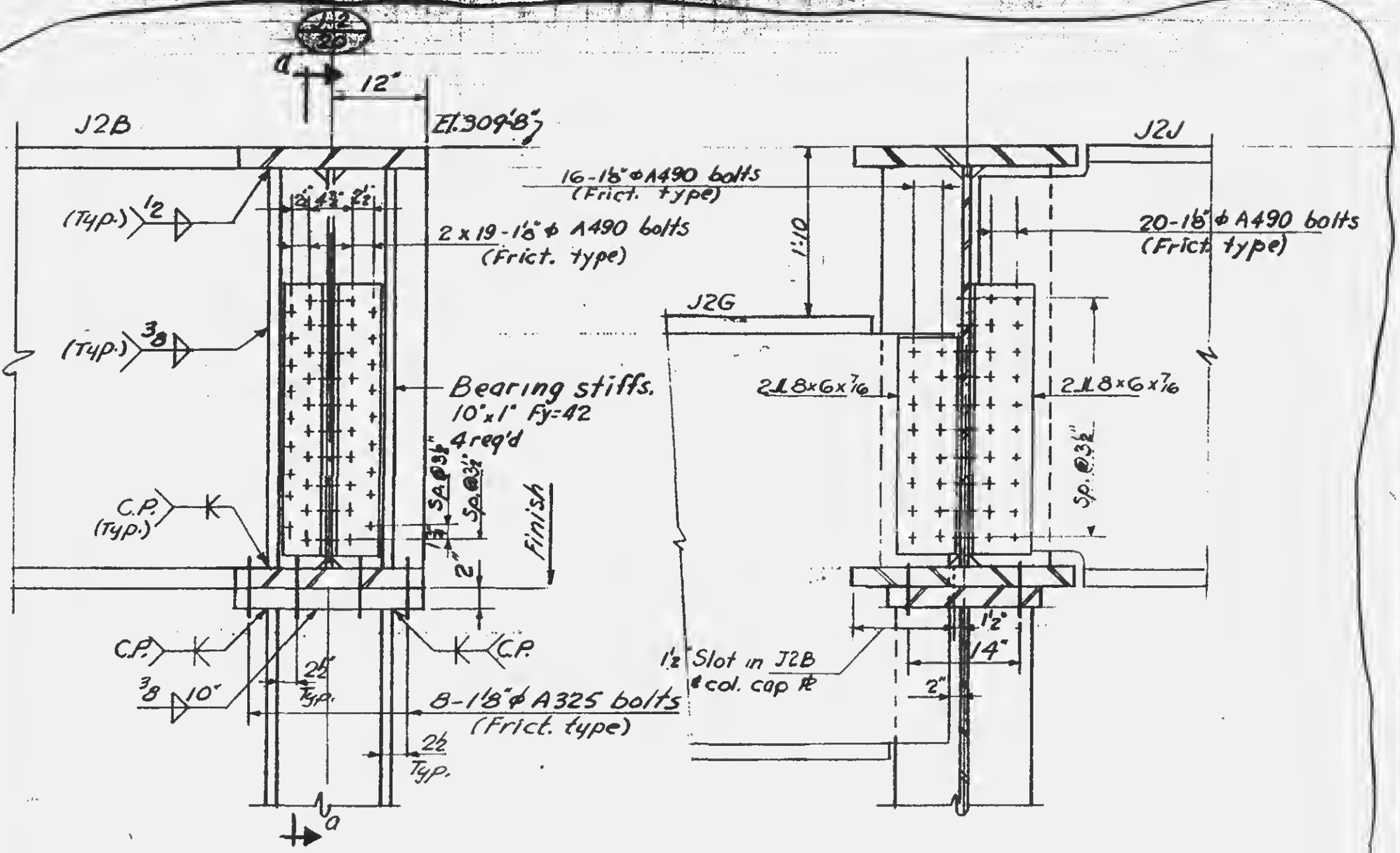
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12-JK2-115

REVISIONS

7-19-68

8-30-68



Section a-a

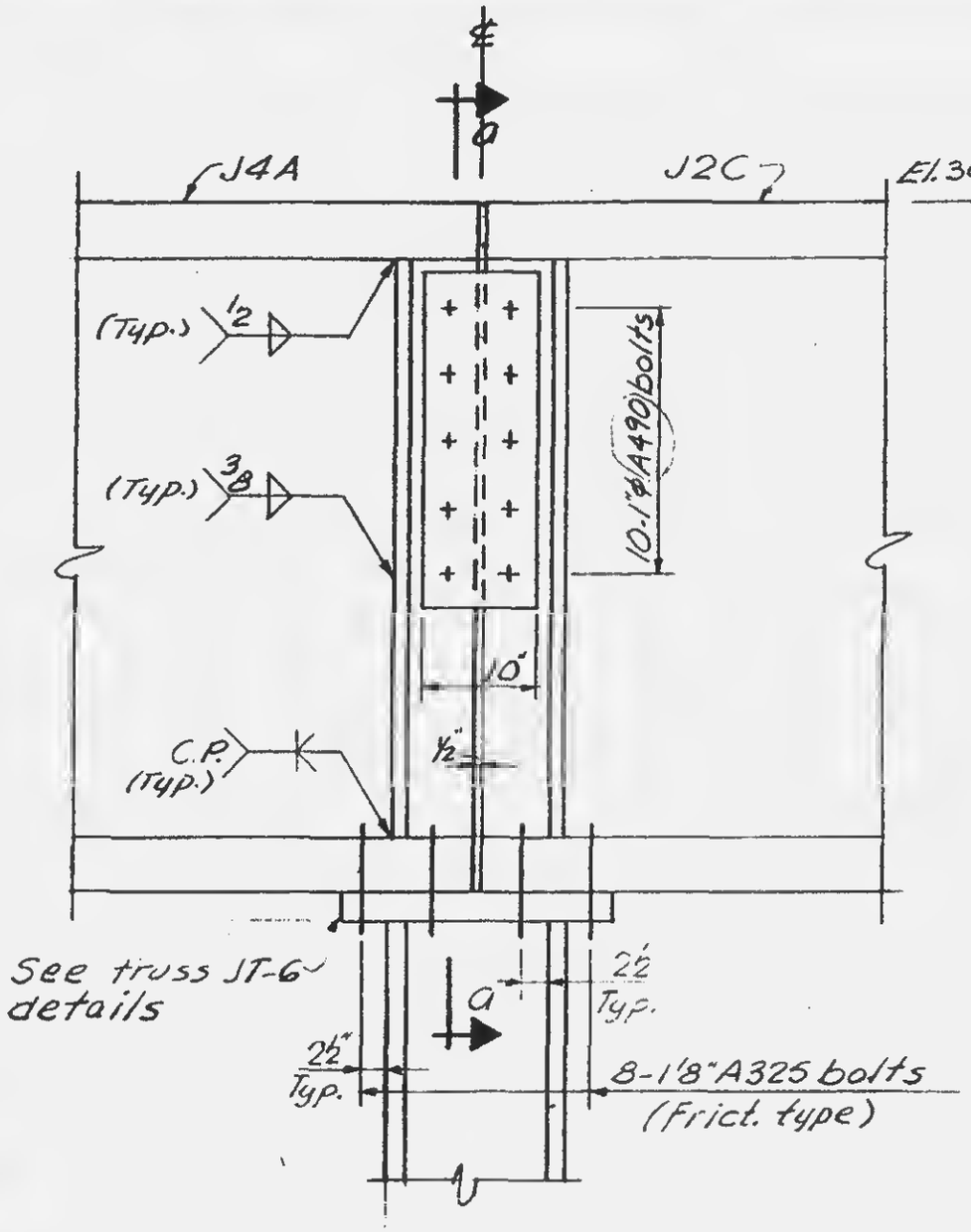
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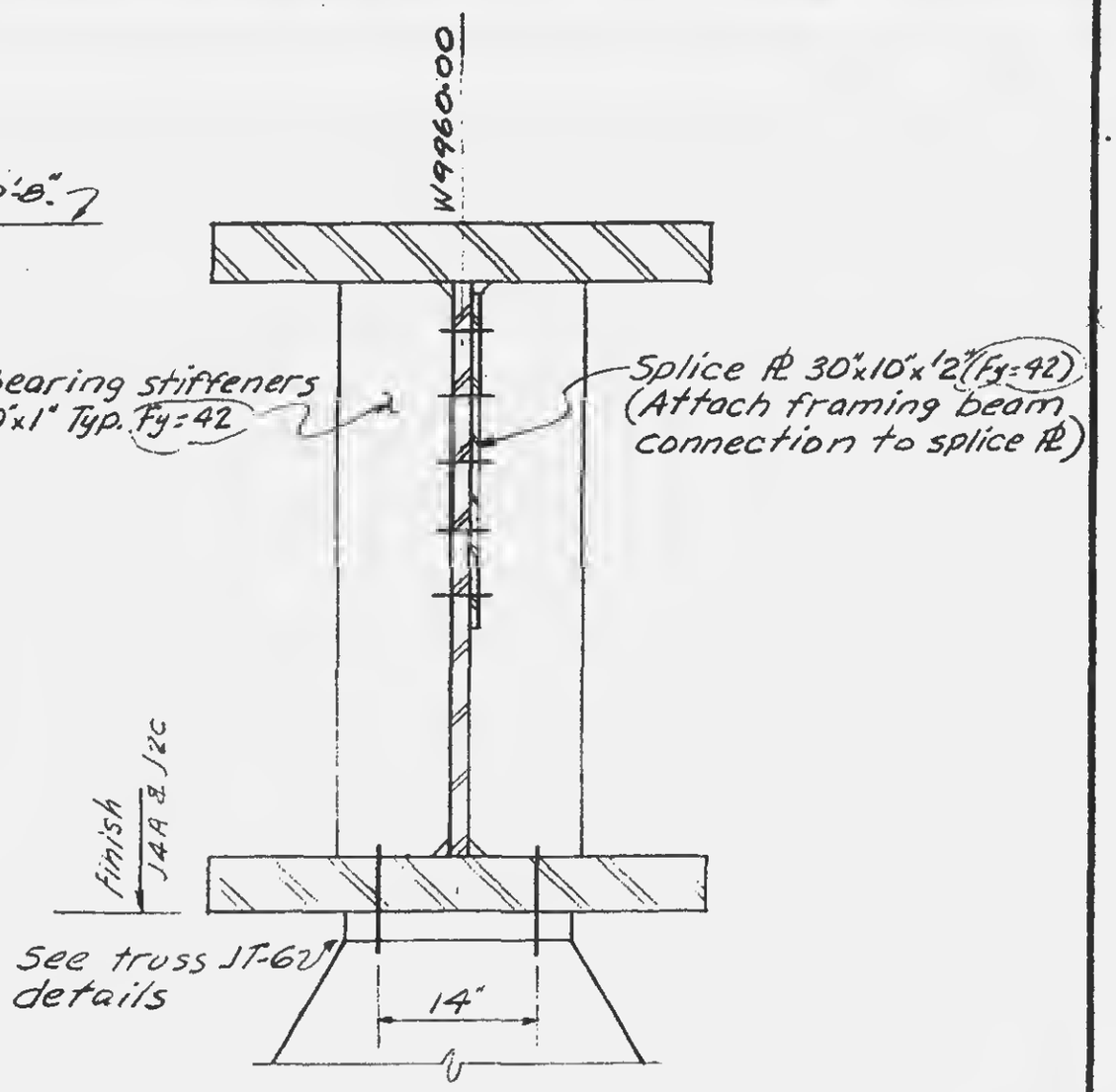
12-JK2-116

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PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAILS | DATE 5-1-68

REVISIONS
7-19-68





Section a-a

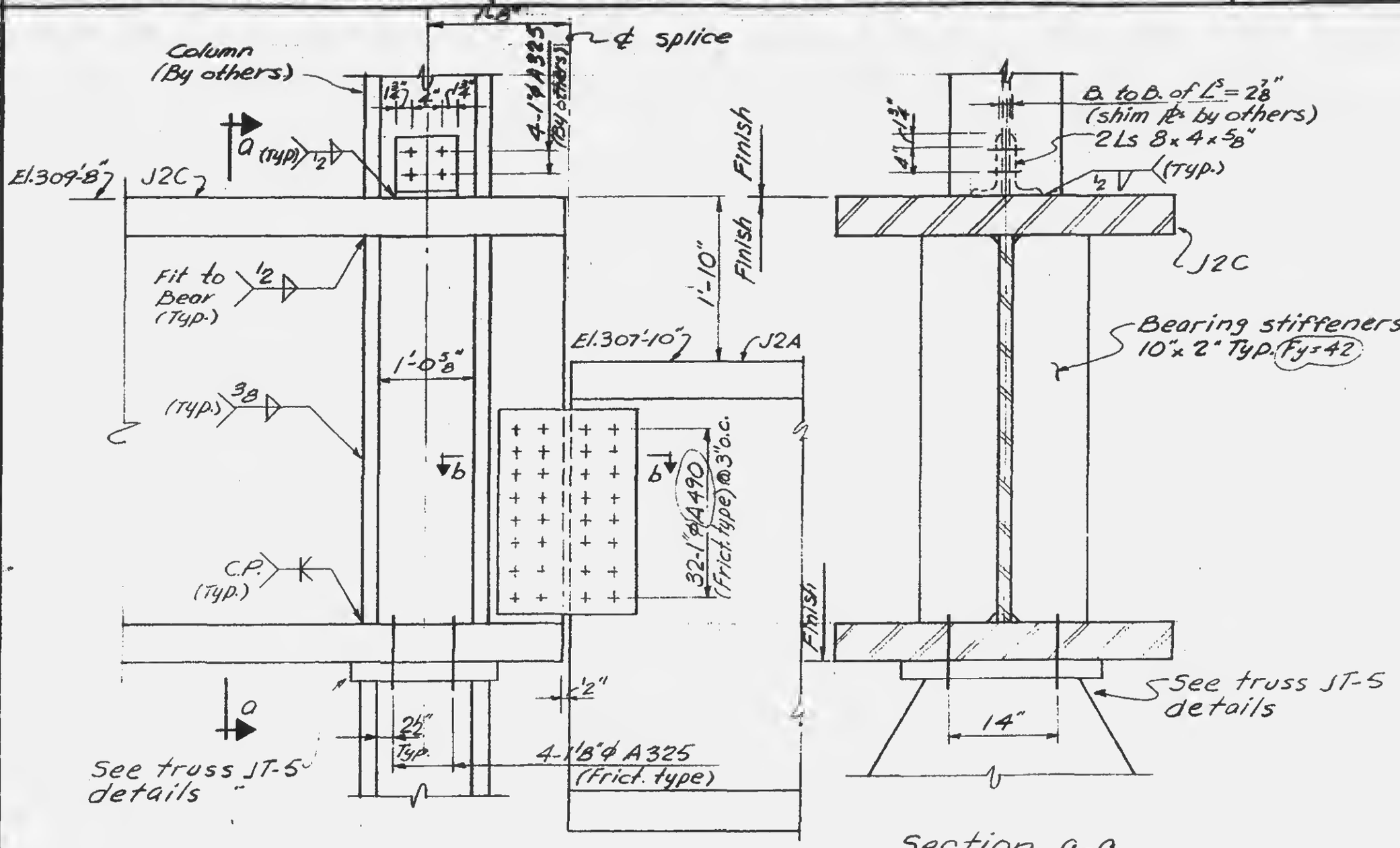
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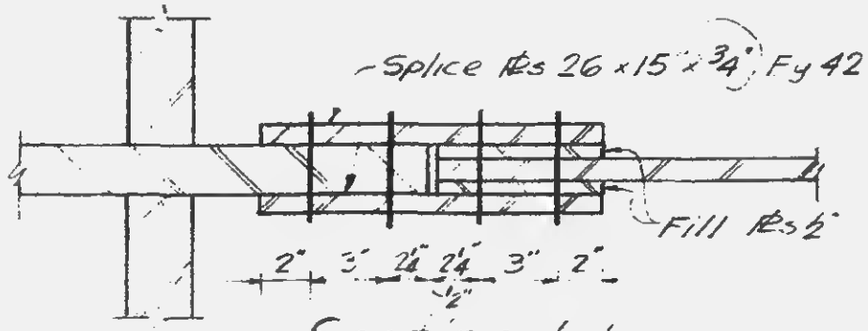
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PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAILS | DATE 5-1-68

REVISIONS
7-19-68





Section b-b

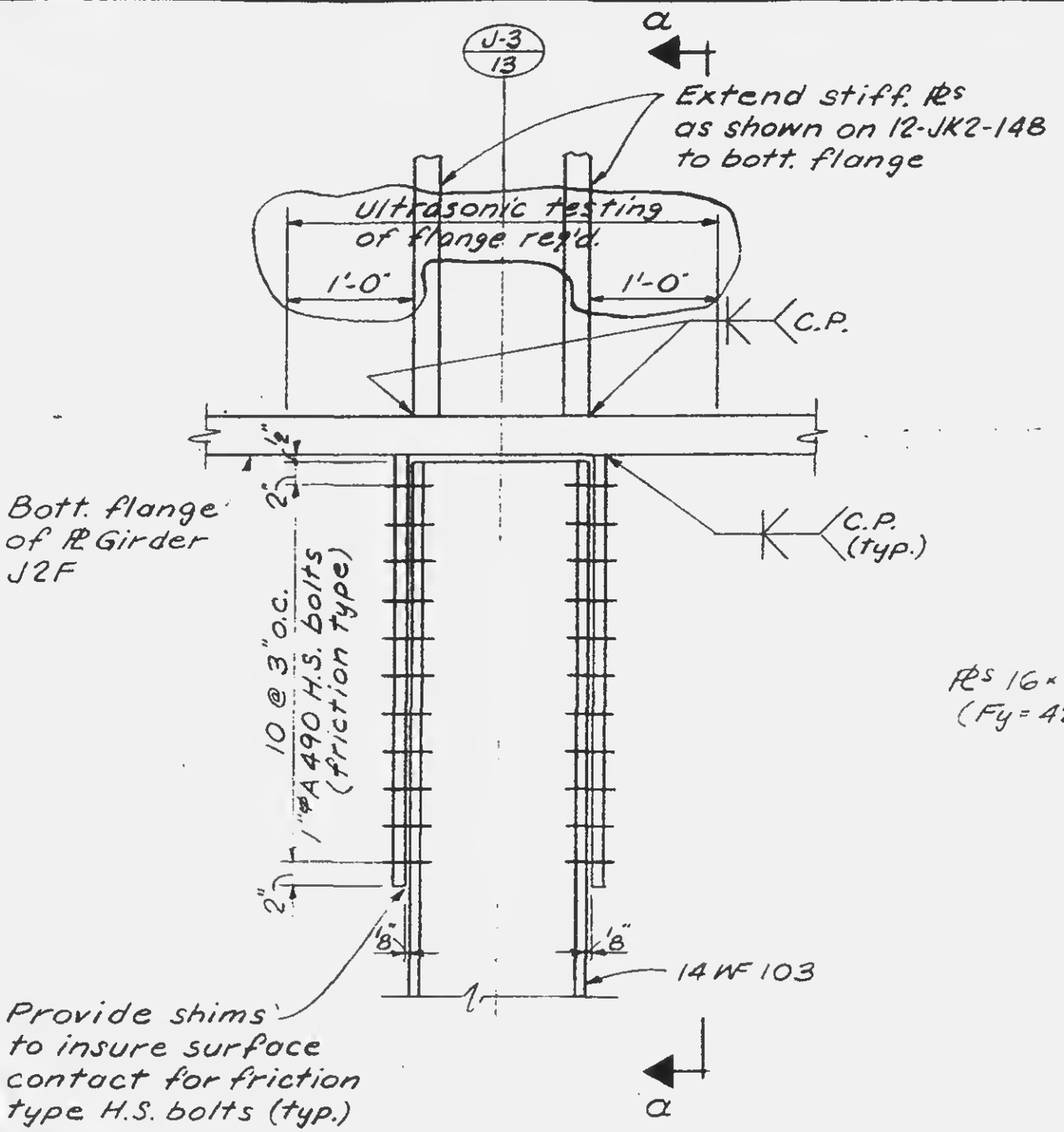
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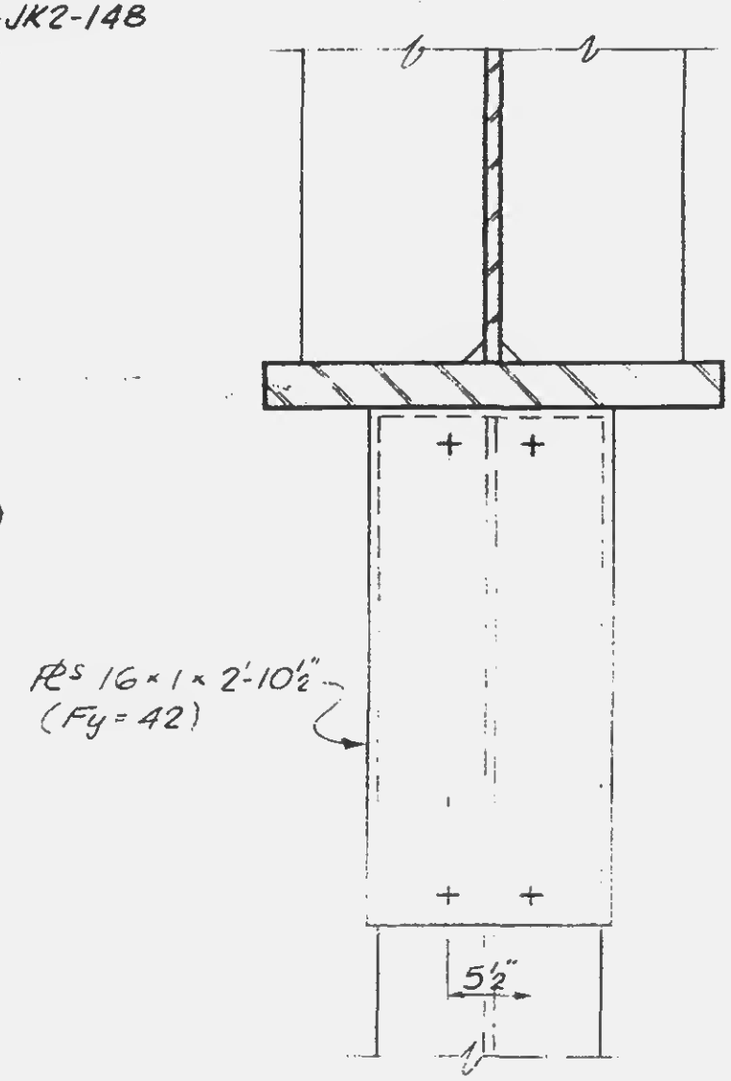
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PROJECT THE WORLD TRADE CENTER | TITLE CONNECTION DETAIL | DATE 6-28-68

REVISIONS
11-5-68
1-8-69





Section a-a

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A.F.

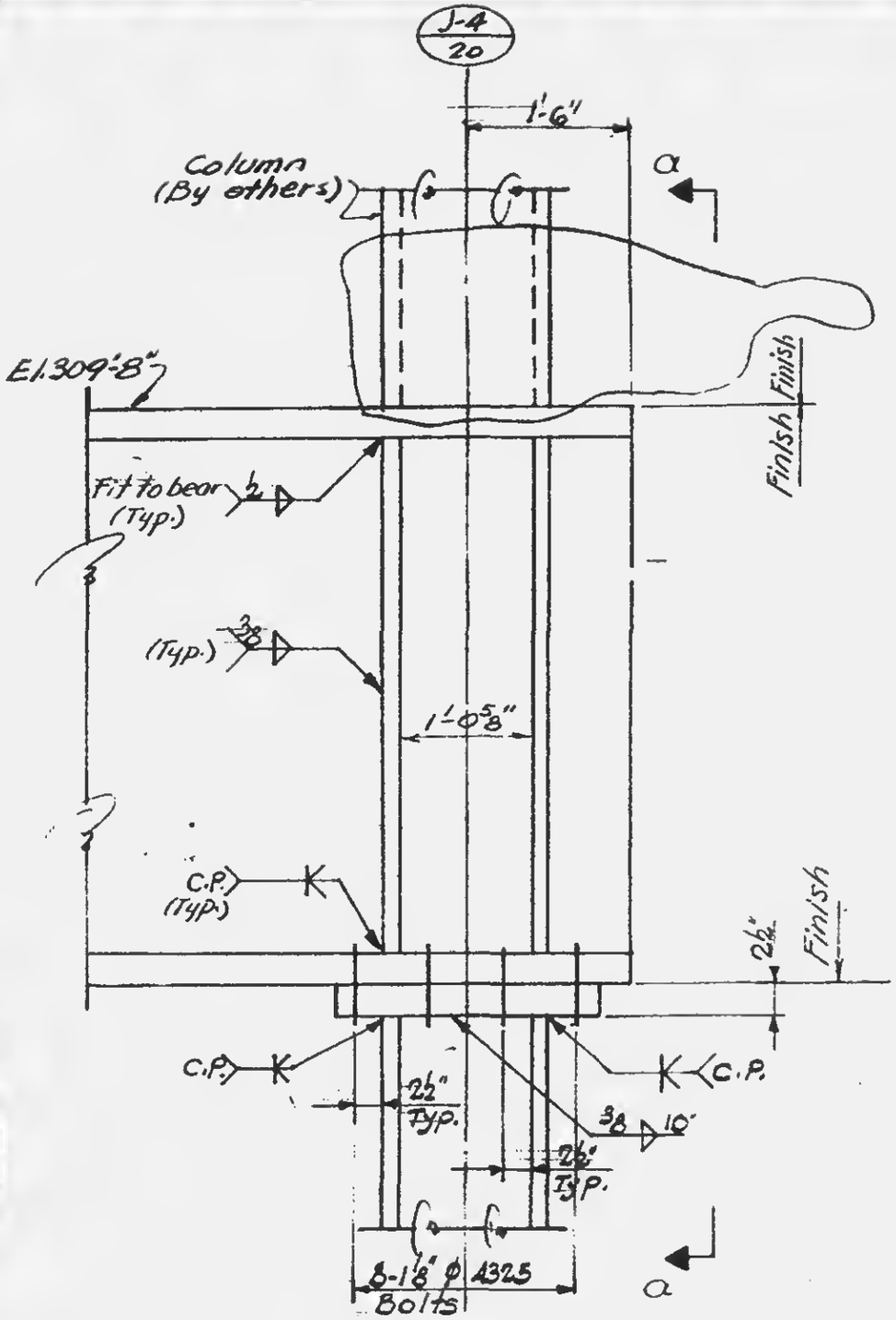
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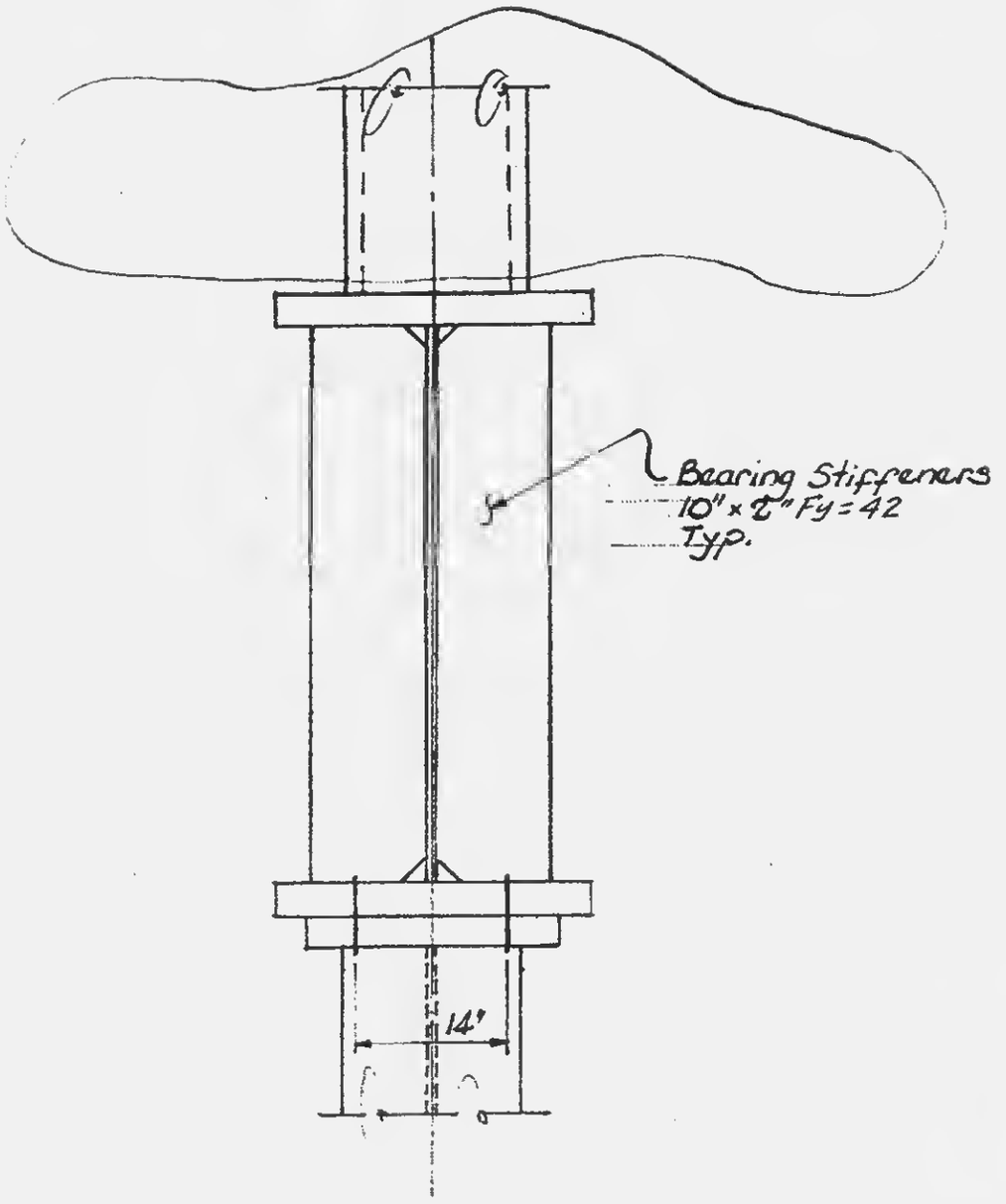
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PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-68

REVISIONS
6-7-68
7-19-68
9-4-68





Section a-a

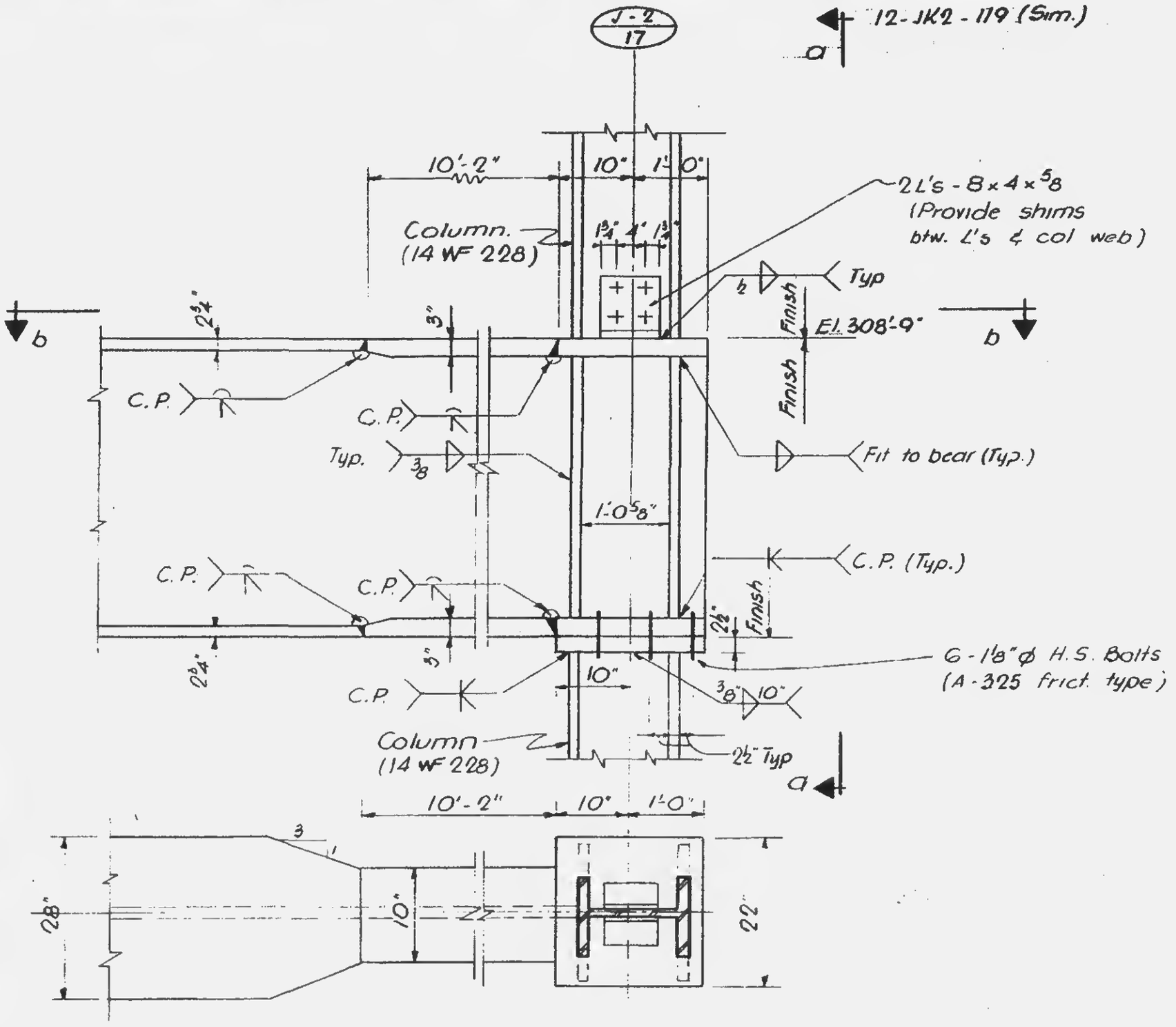
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PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 6-7-68

REVISIONS



Section b-b

12-JK2-119A

REVISIONS

7-19-68

1-3-69 SGNF conn to this end - see 12-JK3-9

DATE

...DER CONNECTION ...

Column (By others)

7" typ. 1/2

2L 8x4x5/16 (Inner flgs) (By others)

JJ4A El. 309'-8"

5 1/2"

2 7/8" slip holes as 12-JK3-9

PL 11 1/2 x 1

3/4" PL (Fy=42)

C.P.

1/2 Fit to bear (Typ.)

3/8 (Typ.)

C.P. (Typ.)

5/16 (Fit to bear)

1/2

2'-10"

1'-6"

1'-4"

Finish

Stiff. PLs 4 1/2" x 3/4" c.f.

A.W.S. min.

5"

2 1/2" Typ.

2'-0"

4-1 1/8" A325 bolts

3 1/2"

1'-6"

1"

a

2L 8x4x5/16

B. to B. of L - 2 1/8" (shim PLs by others)

4" 1 1/2"

1/2 (Typ.)

Finish

13"

Bearing stiffeners 12" x 2 1/2" Typ. Fy=42

C.P.

1/2"

See truss JT9 details

14"

Section a-a

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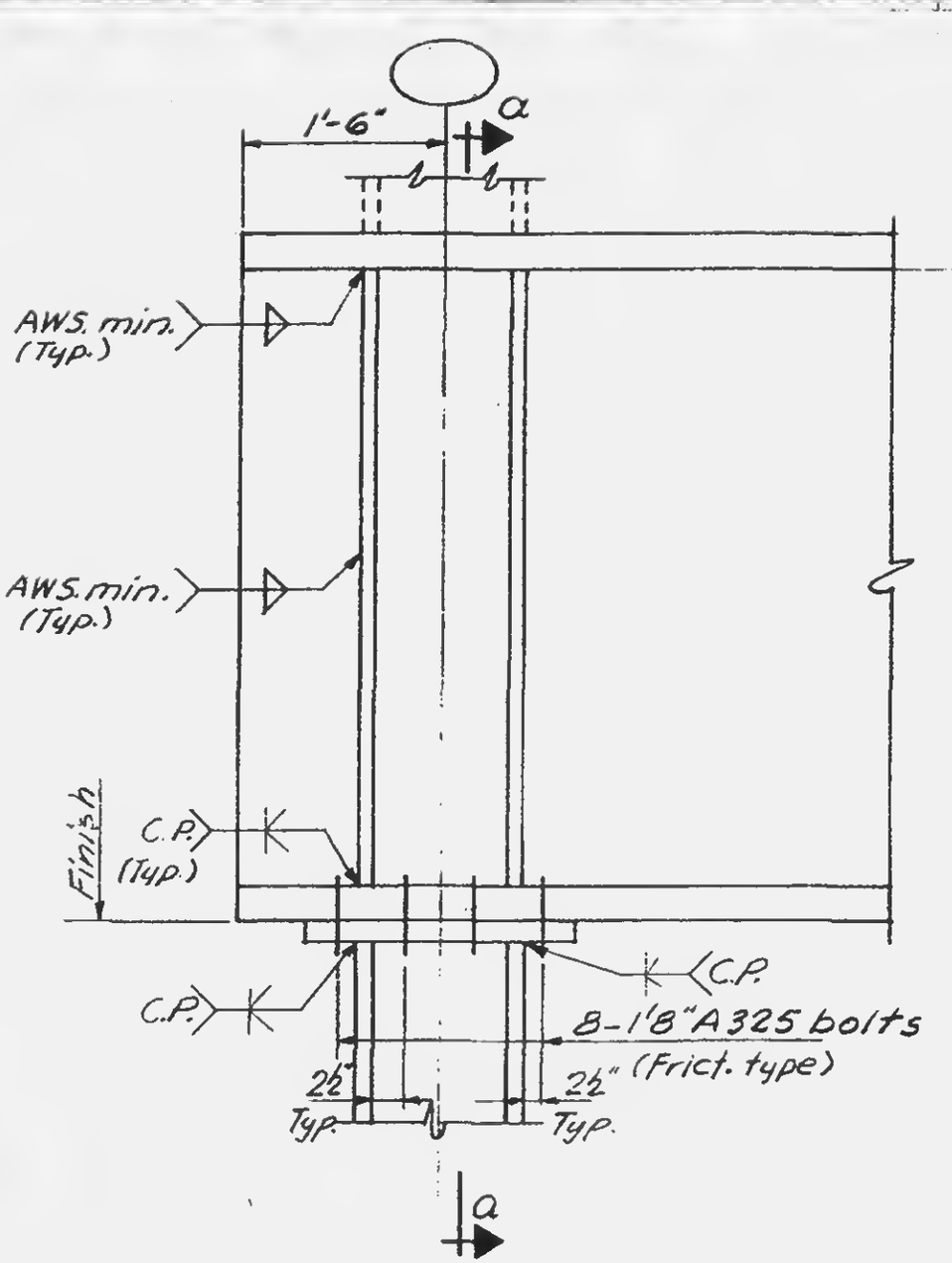
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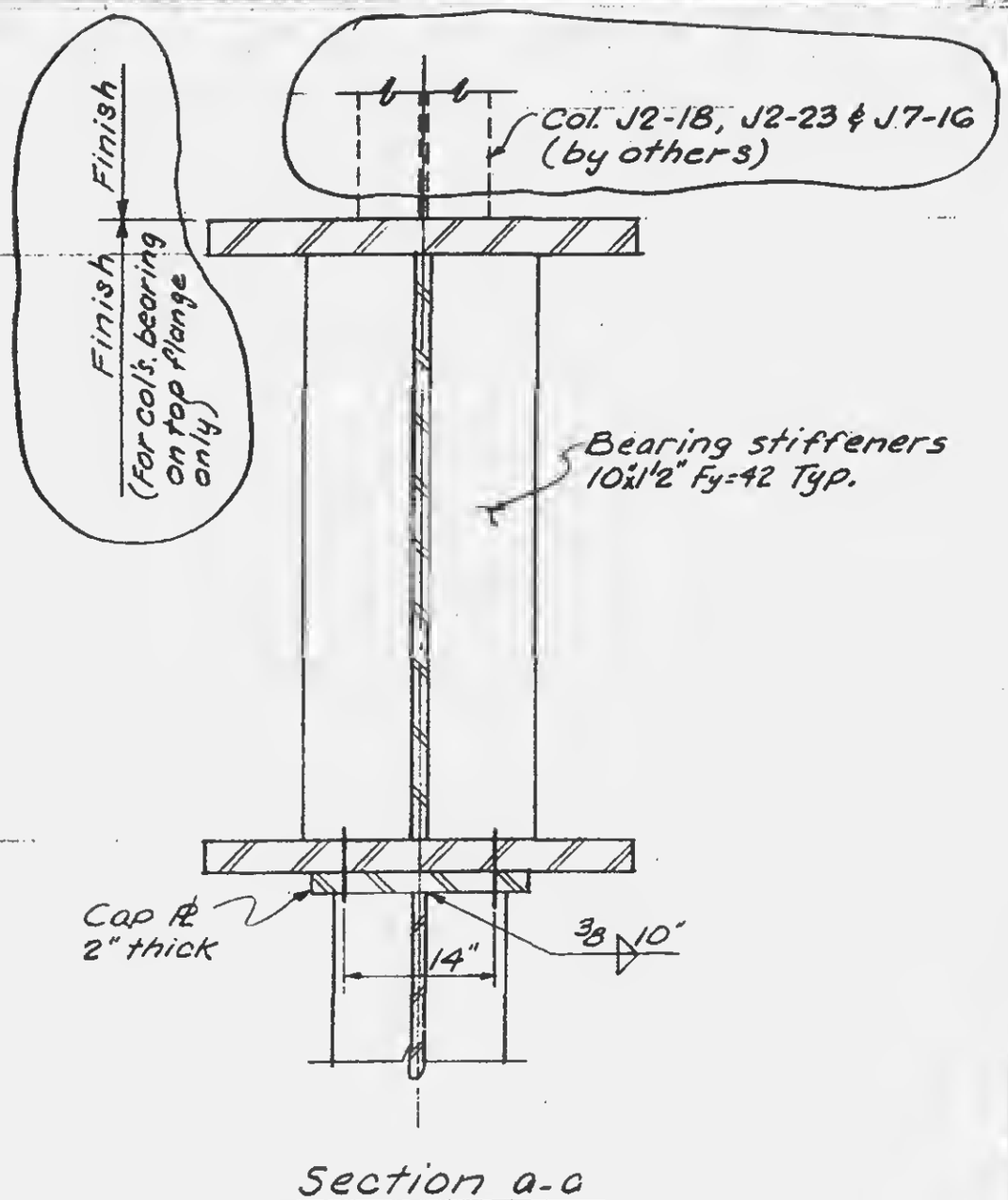
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PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-68

REVISIONS
7-19-68
8-30-68
11-5-68





Section a-a

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THE STATE OF NEW YORK

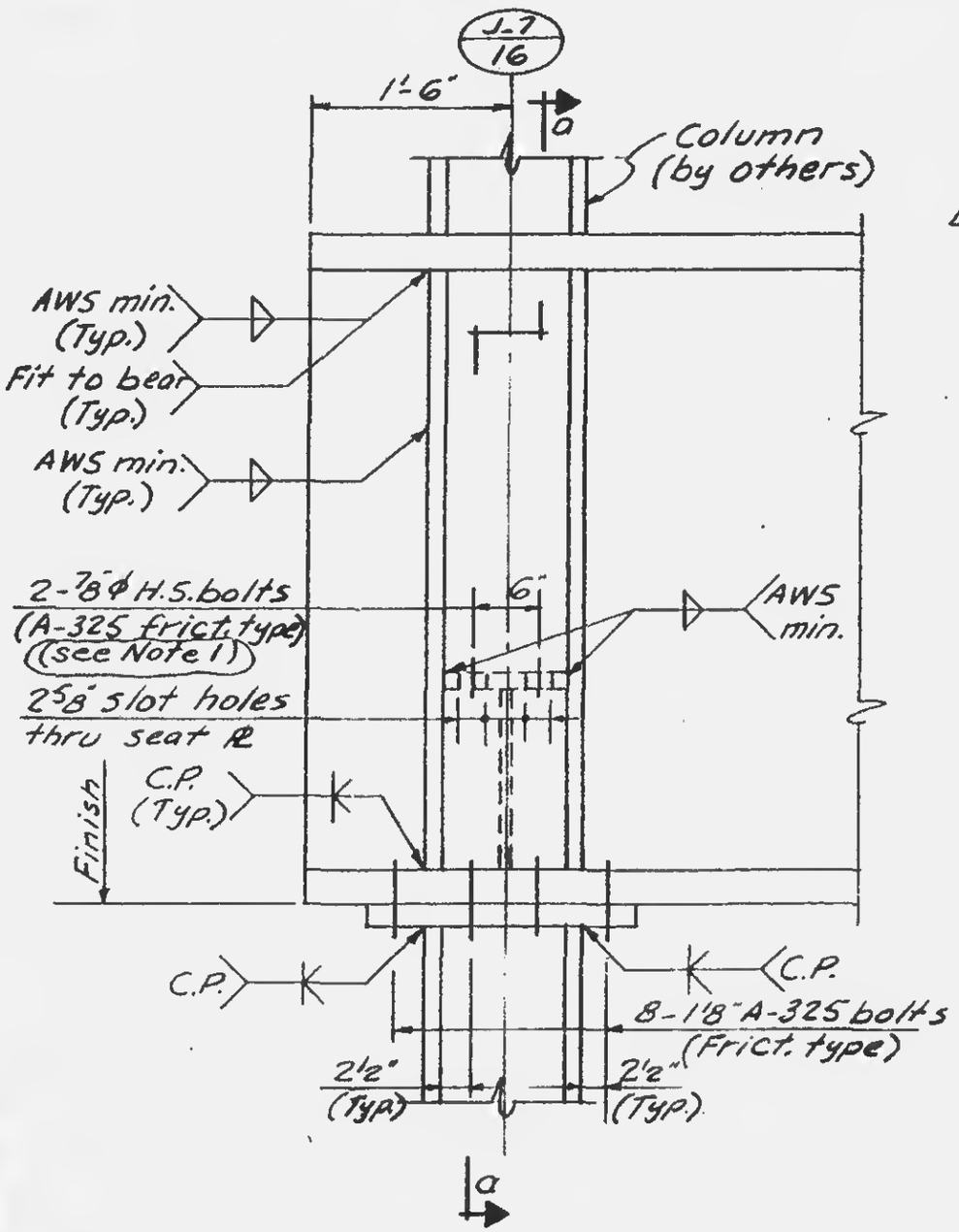
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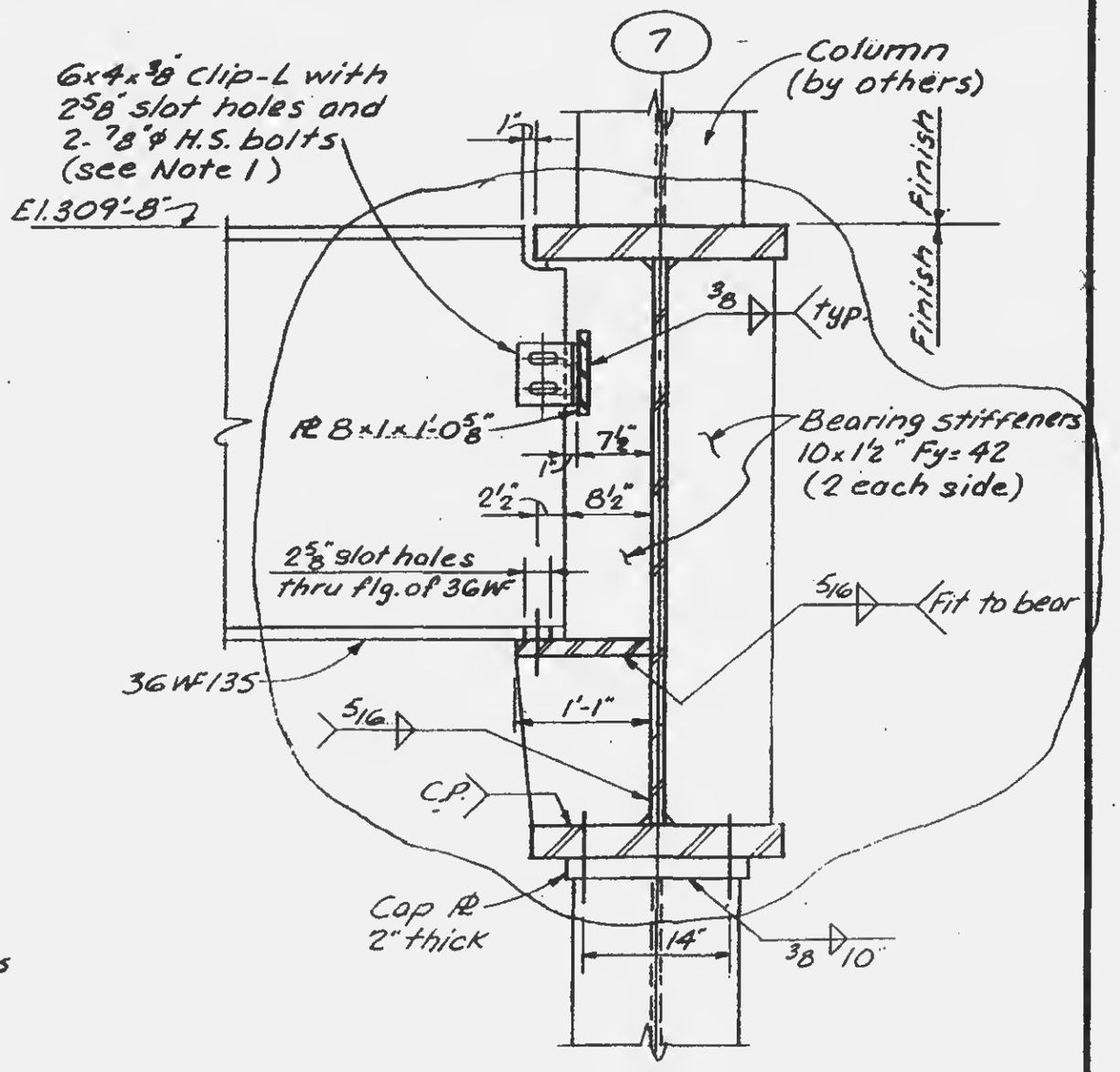
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PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 3-17-69

REVISIONS

4-18-69





Section a-a

Notes:

1. Tighten all bolts only after pouring concrete to the strip of Const. Jt. as shown on plan.

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DESIGNED

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A.L. FRANQUI

REVIEWED
E.L.

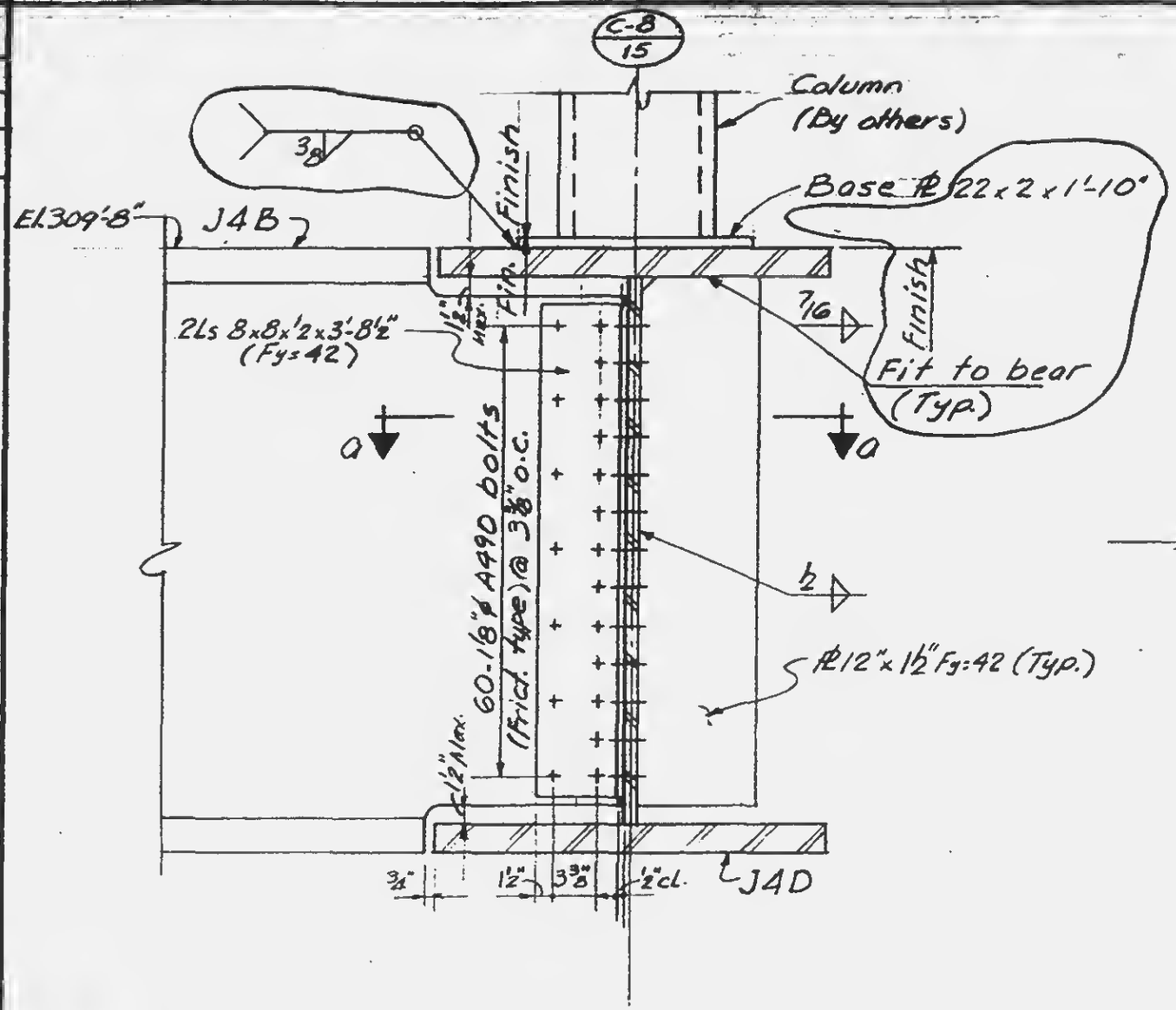
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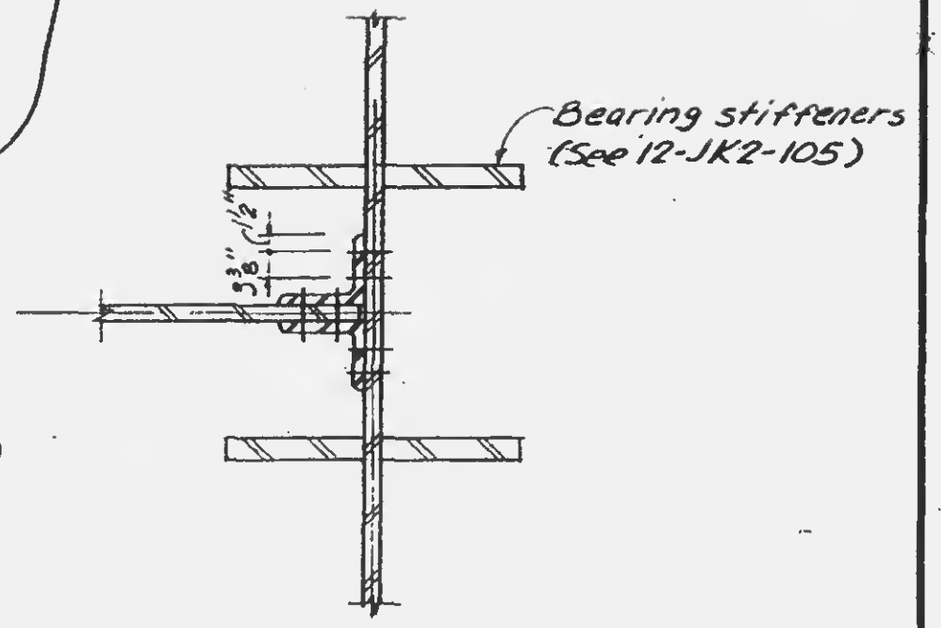
LEE-CHRISTIANSEN

WORD TRAILER — GIRDER CONNECTION DETAIL

DATE 5-1-68

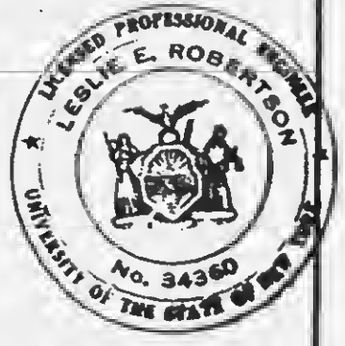
REVISIONS
7-19-68
9-4-68
12-3-68





Section a-a

Note:
Some bearing stiffeners omitted from elevation for clarity. see Section a-a.

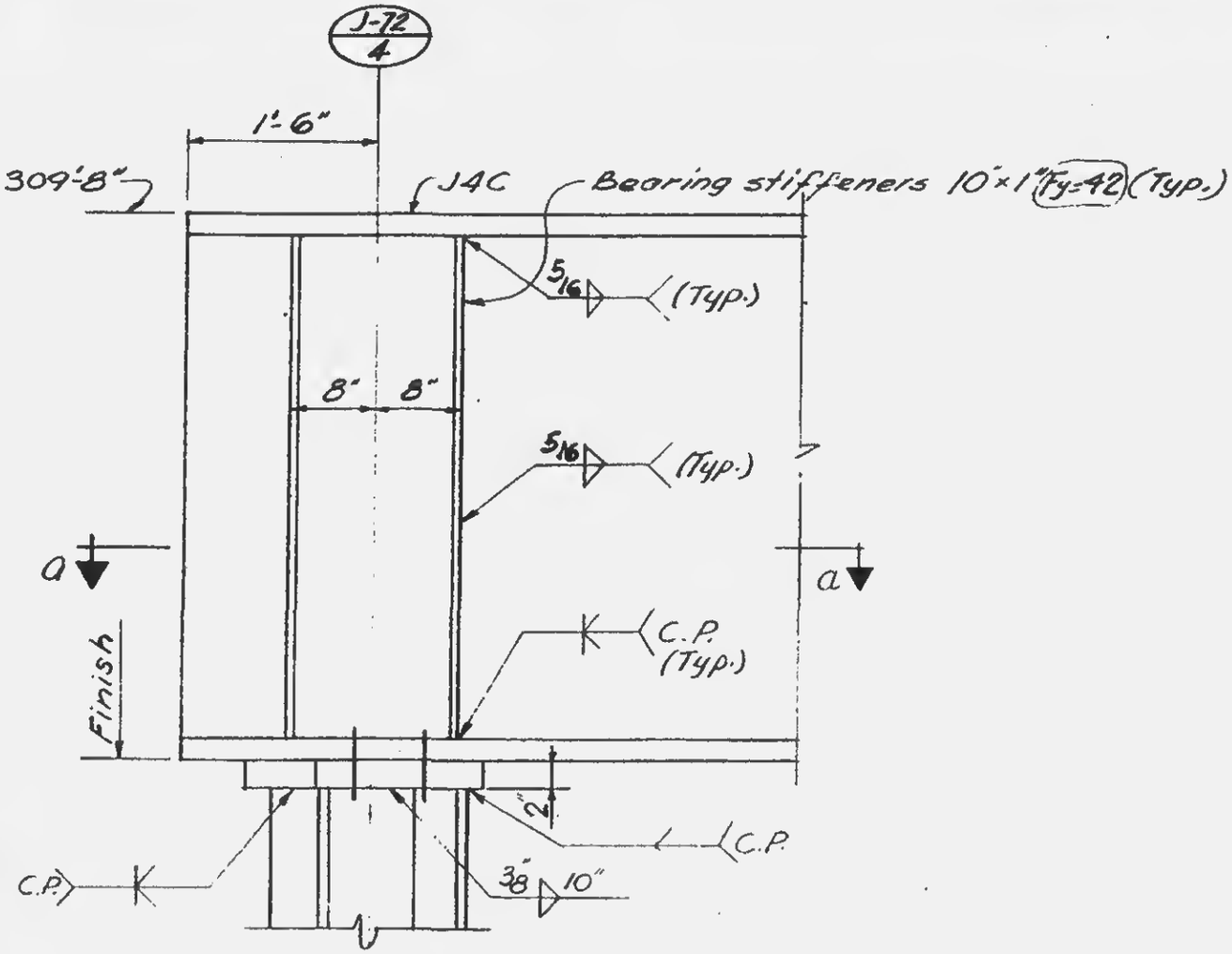


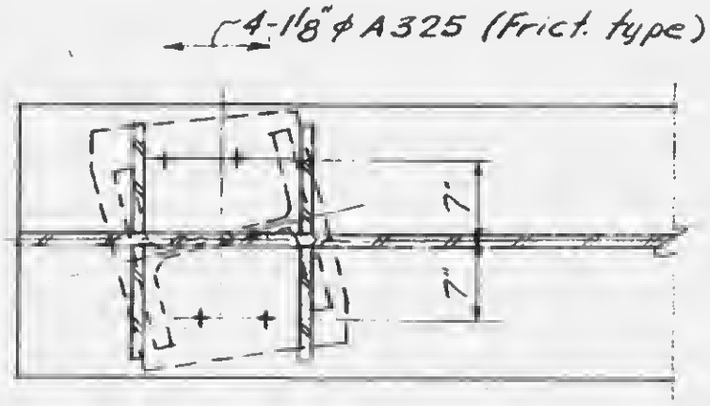
12-JK2-122

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PROJECT: THE WORLD TRADE CENTER | TITLE: GIRDER CONNECTION DETAIL | DATE: 5-1-68

REVISIONS
6-28-68
7-19-68





Section a-a

Note:
This detail similar to detail 12-JK2-128 except bolts must match skewed column as shown in section a-a

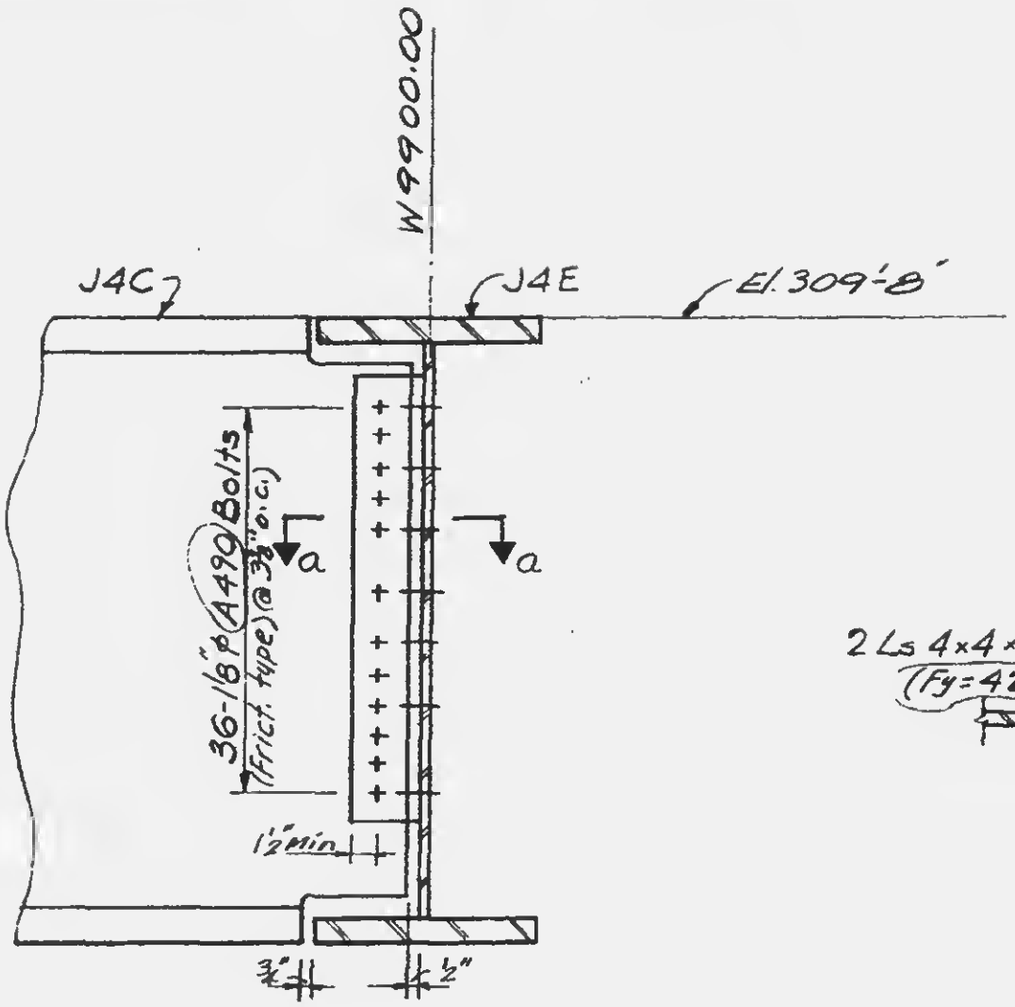
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No. 54360
UNIVERSITY OF THE STATE OF NEW YORK

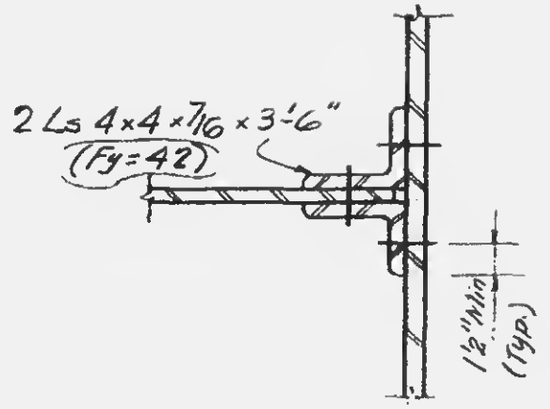
12-JK2-123

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — STRUCTURAL & CIVIL ENGINEERS

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 3-1-68

REVISIONS
7-19-68

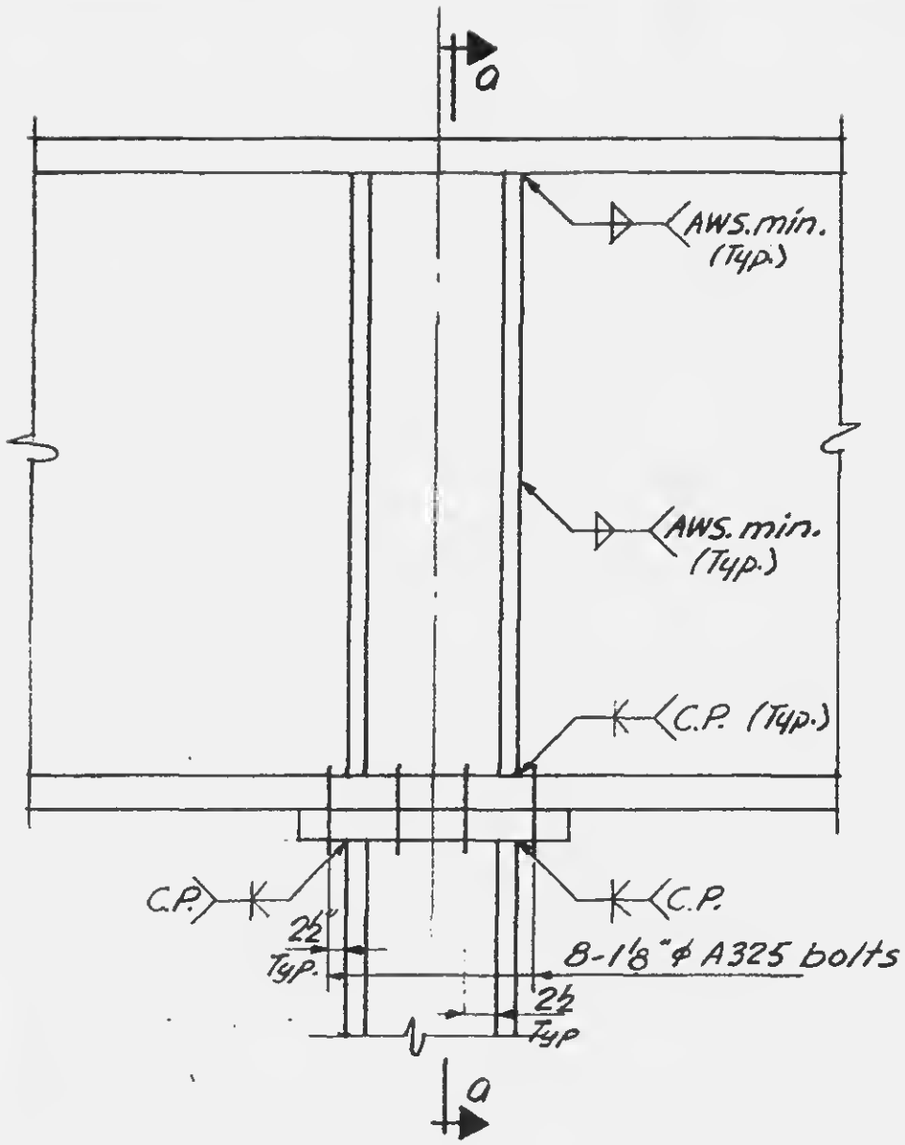


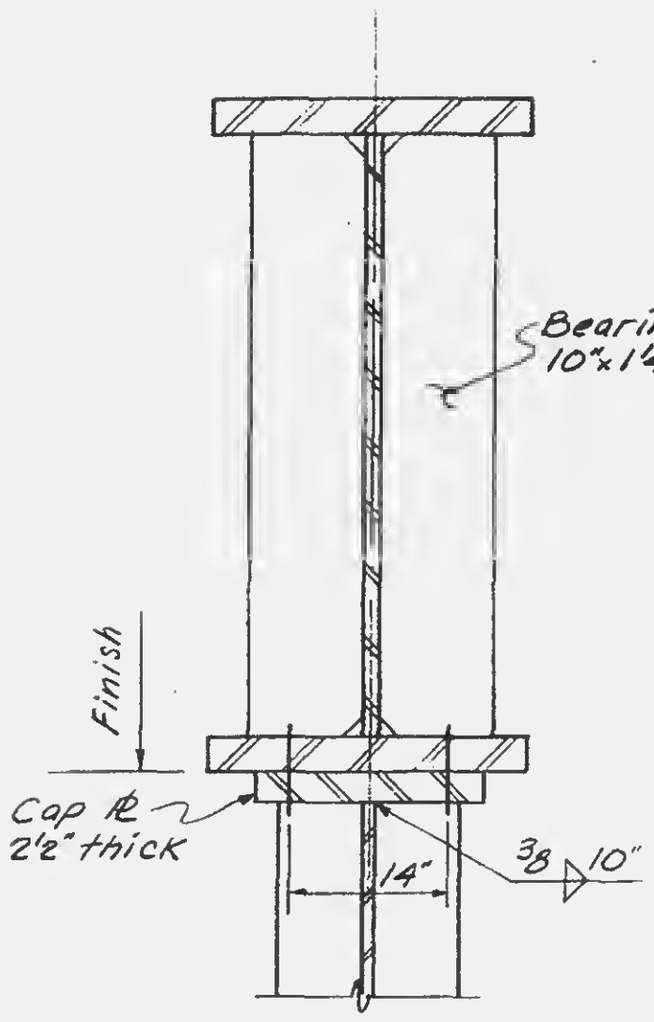


Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-124



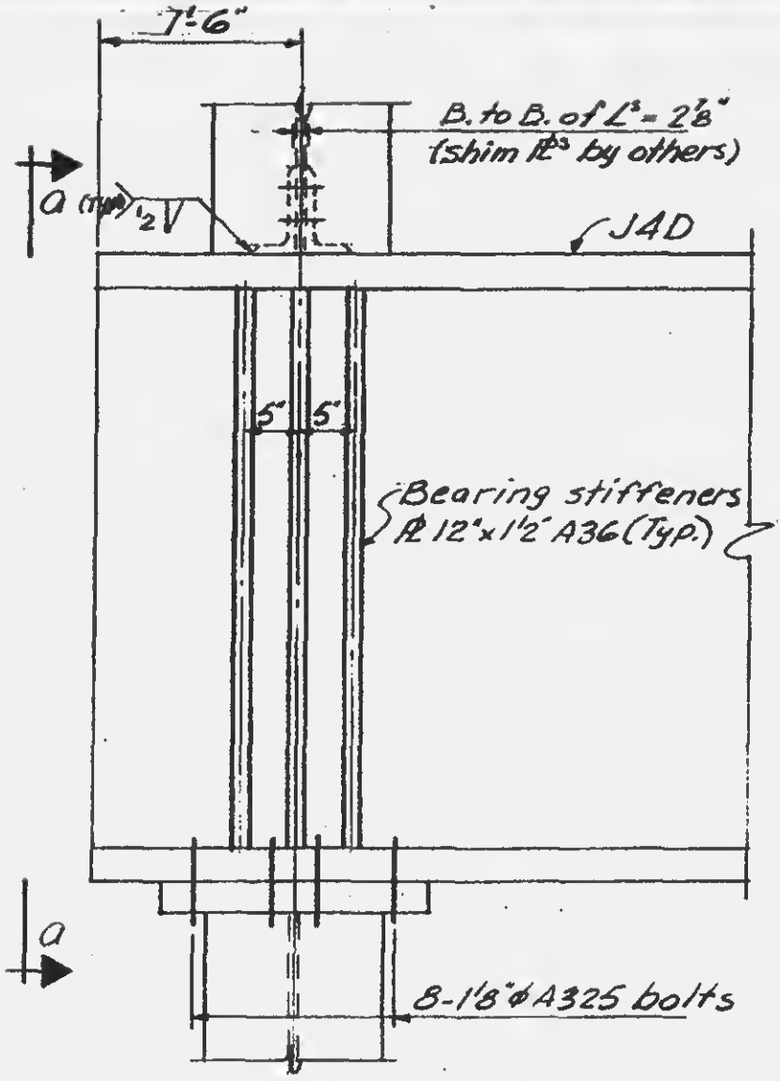


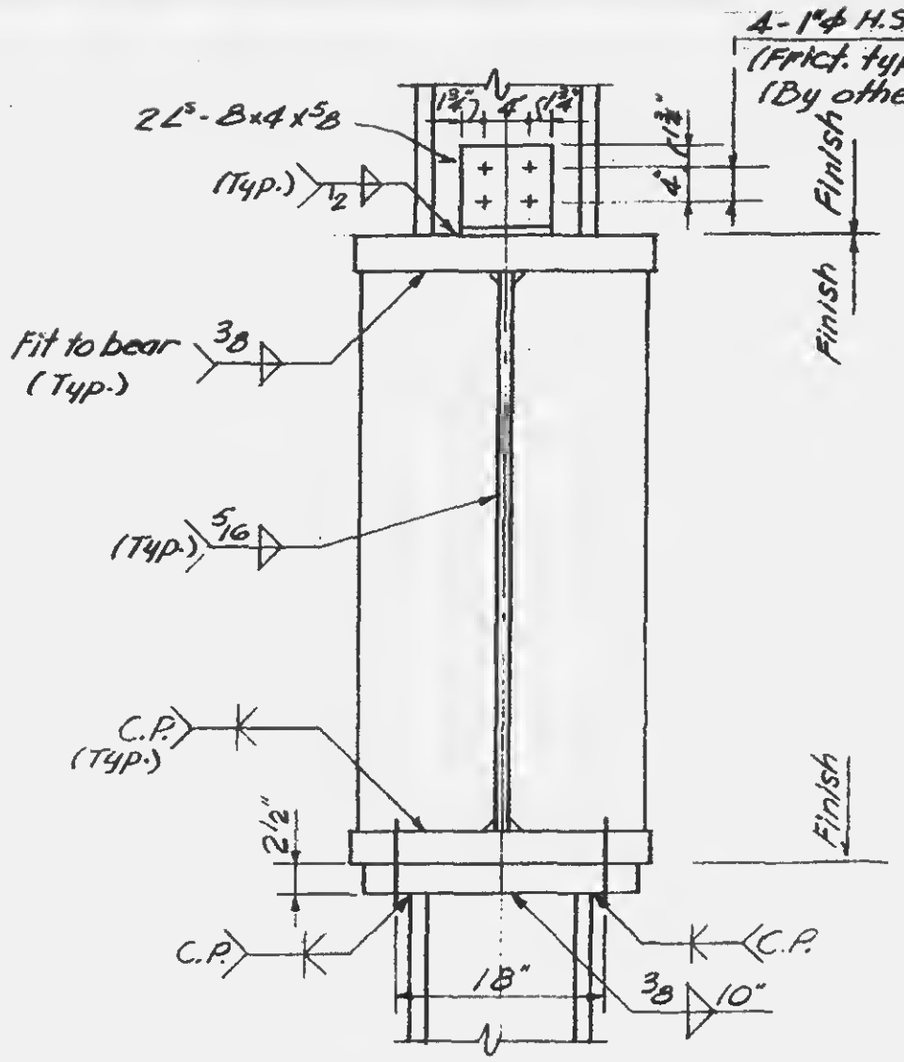
Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
OF THE STATE OF NEW YORK

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-65

REVISIONS





Section a-a

BOARD PROFESSIONAL ENGINEERS LESLIE E. ROBERTSON No. 9480 REGISTERED IN THE STATE OF NEW YORK

12-JK2-126

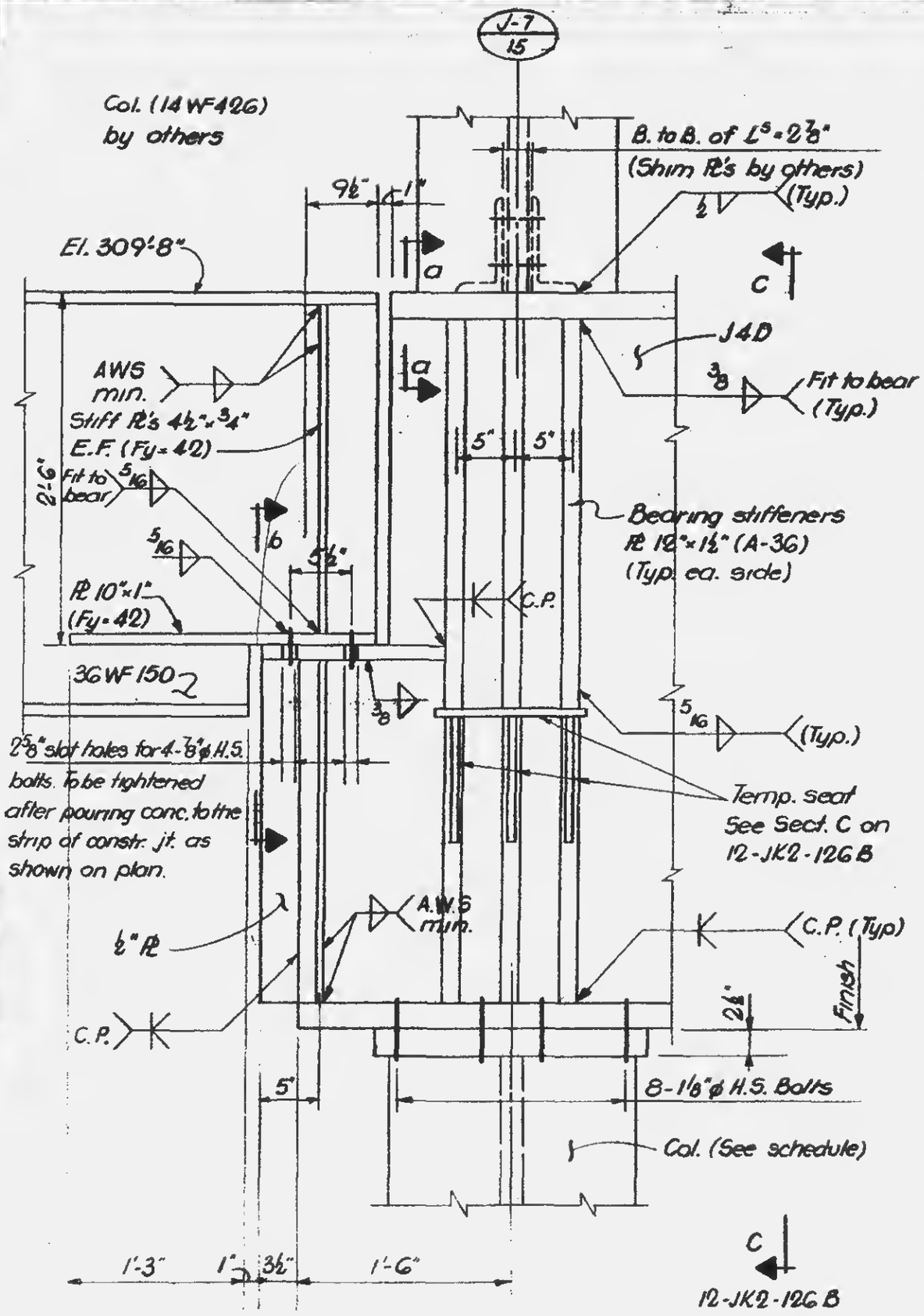
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

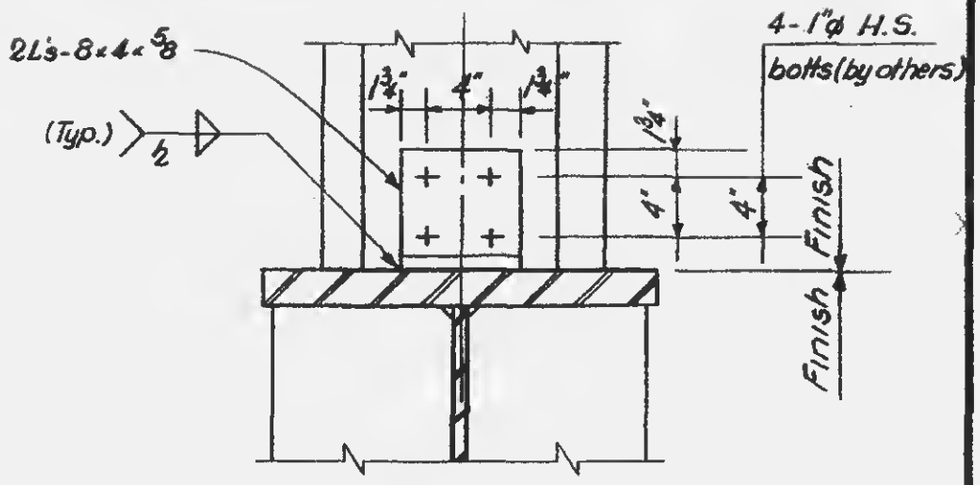
PROJECT: THE WORLD TRADE CENTER

TITLE: GIRDER CONNECTION DETAIL

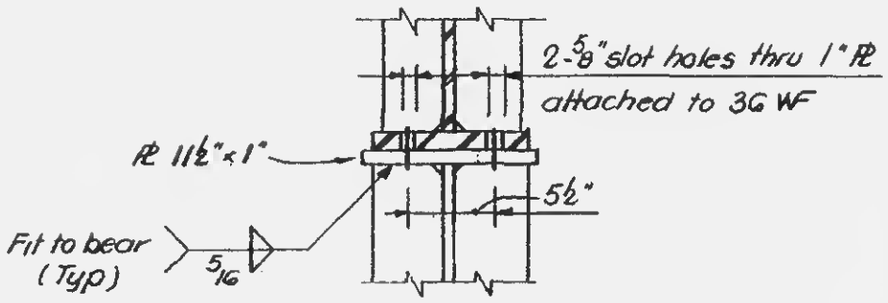
DATE: 1-20-69

REVISIONS





Section a-a



Section b-b

Notes:

1. All H.S. bolts to be A-325 friction type, except as noted
2. All welds to be E 70xx.
3. Provide washers 2½ x 5/8 (square or round) with fy = 50 ksi for all bolts over slot holes.

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN: G.T.H.

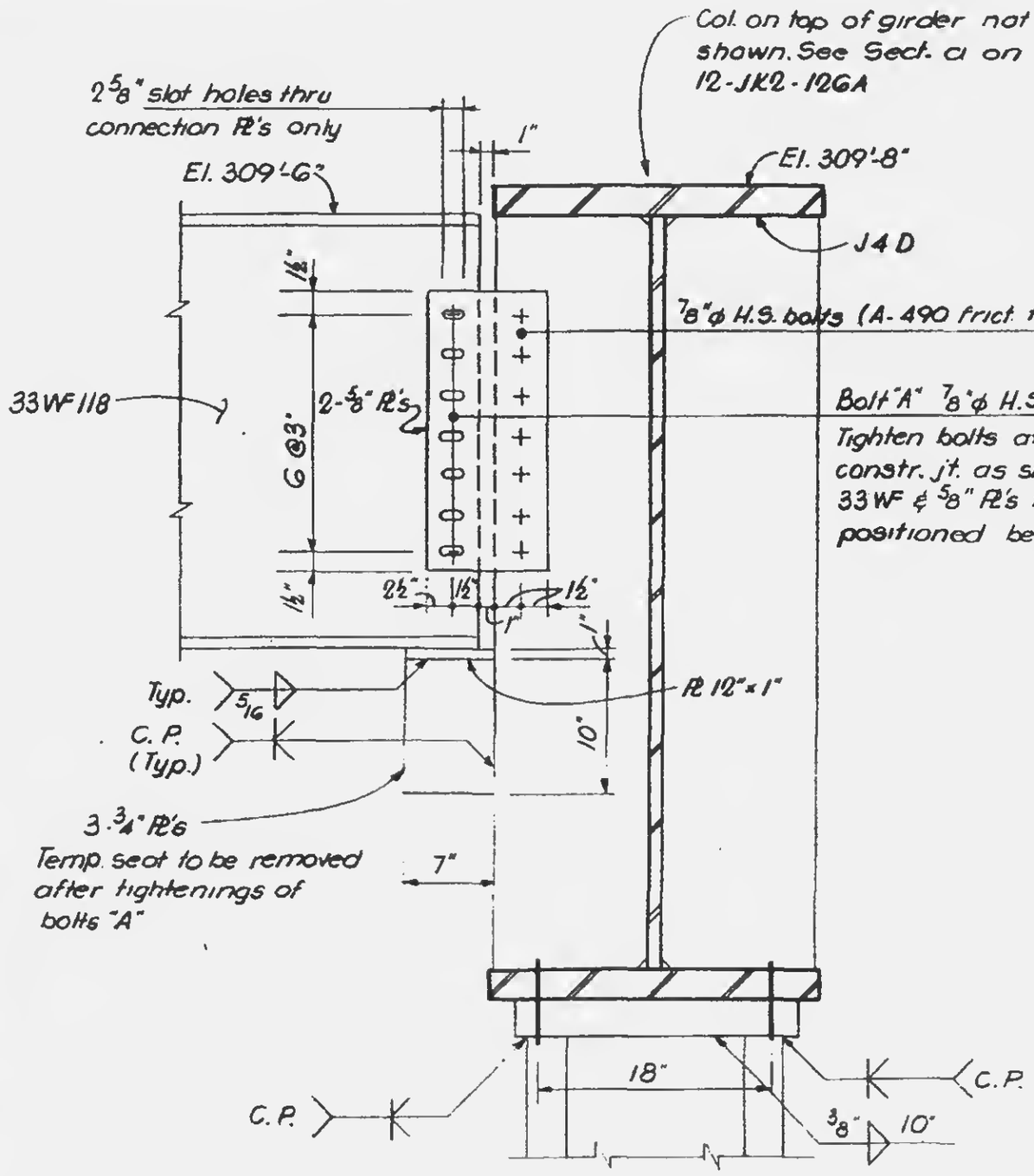
REVIEWED: E.L.

12-JK2-126A

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 1-20-69

REVISIONS



Section c-c

Notes:

1. All welds to be E70xx.
2. Provide washers 2½x5/8 (square or round) with fy=50ksi for all bolts over slot. holes.

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34960 — UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN G.T.H.

REVIEWED E.L.

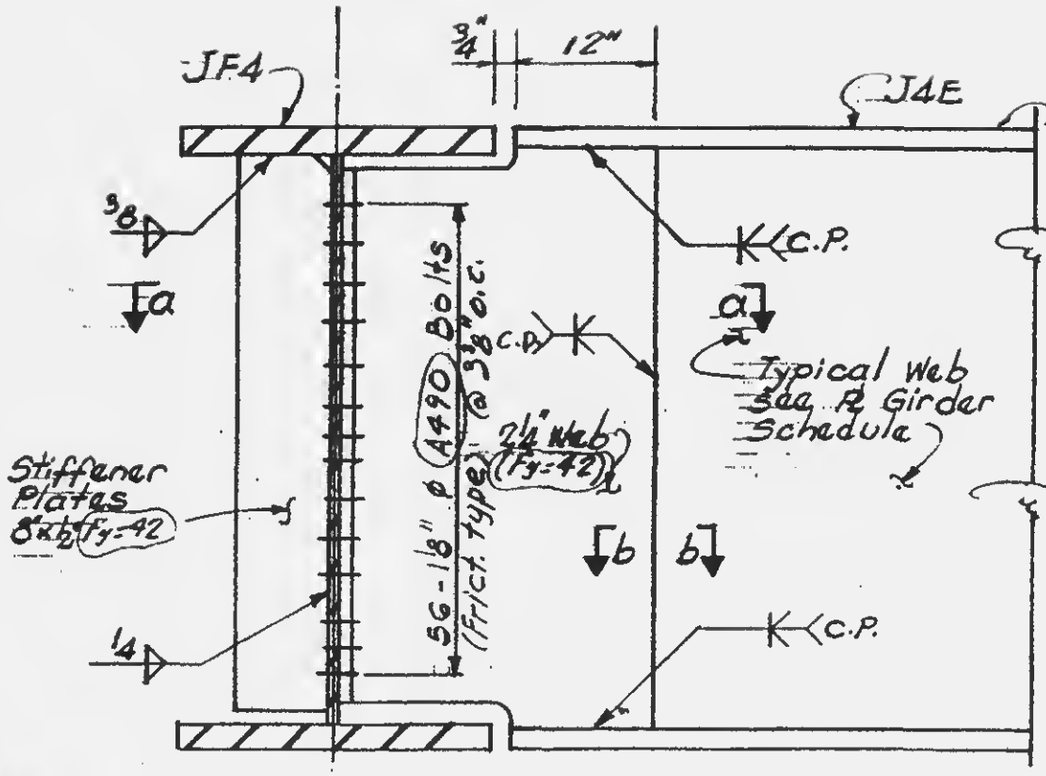
12-JK2-126B

REVISIONS

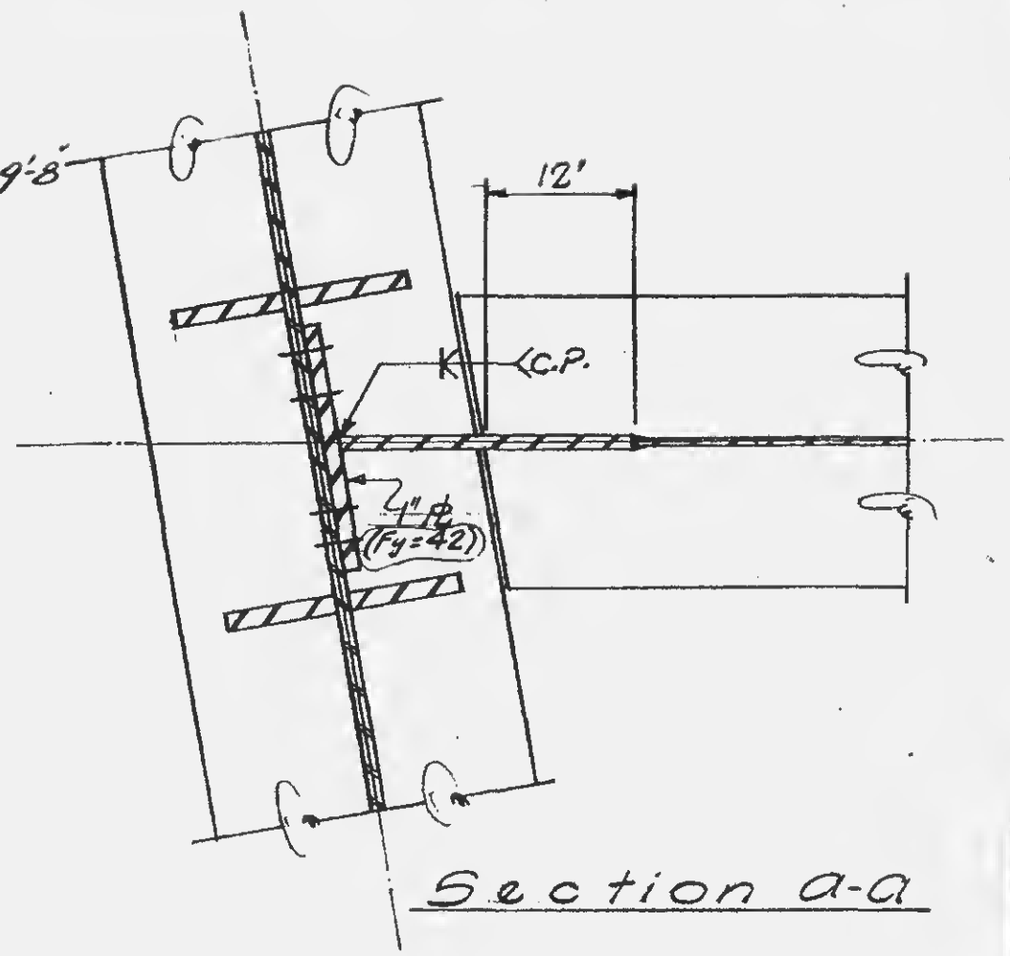
7-19-68

GIRDER CONNECTION DETAIL

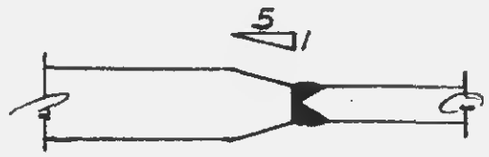
DATE



Note:
Some stiffeners omitted from elevation for clarity, see section a-a



Section a-a



Section b-b

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

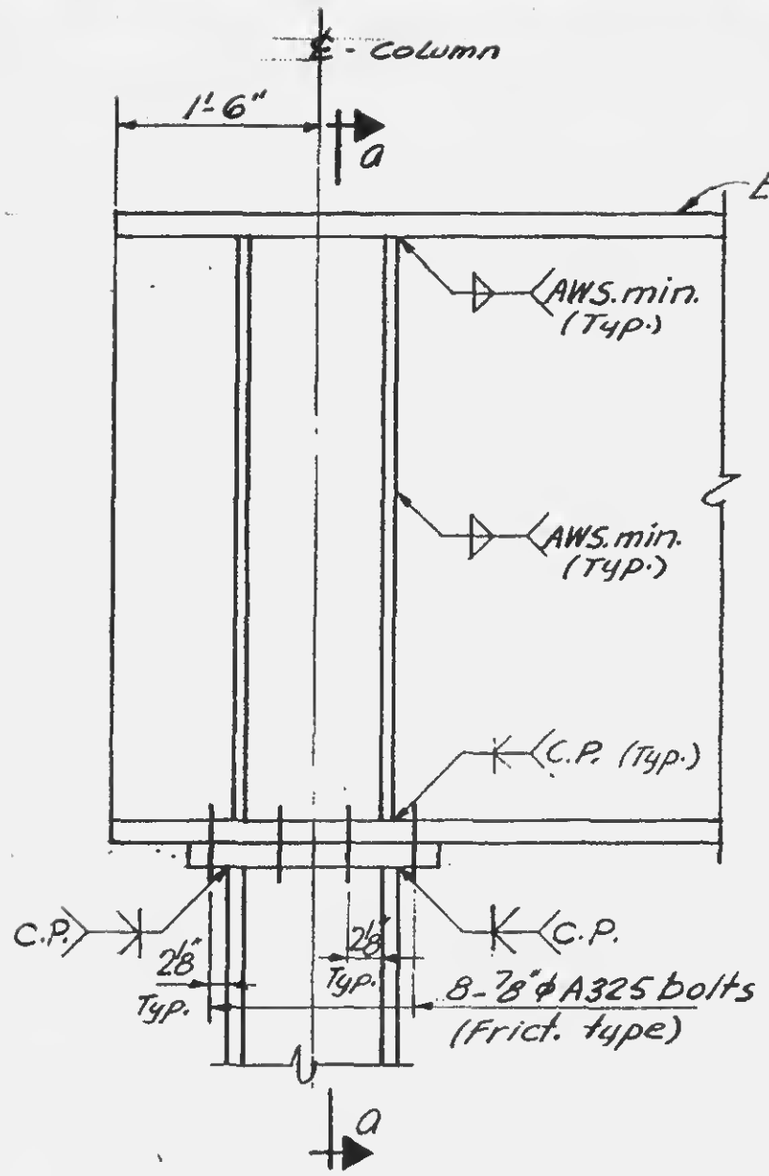
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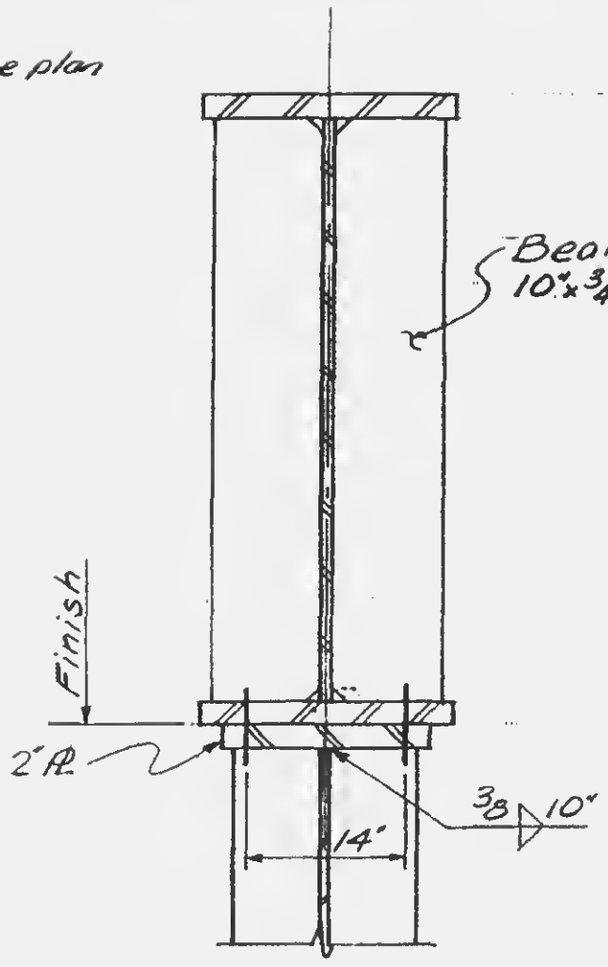
PROJECT: NWE WORTHINGTON CENTER		GIRDER CONNECTION DETAIL	SHEET: 3-16

REVISIONS

6-28-68

7-19-68

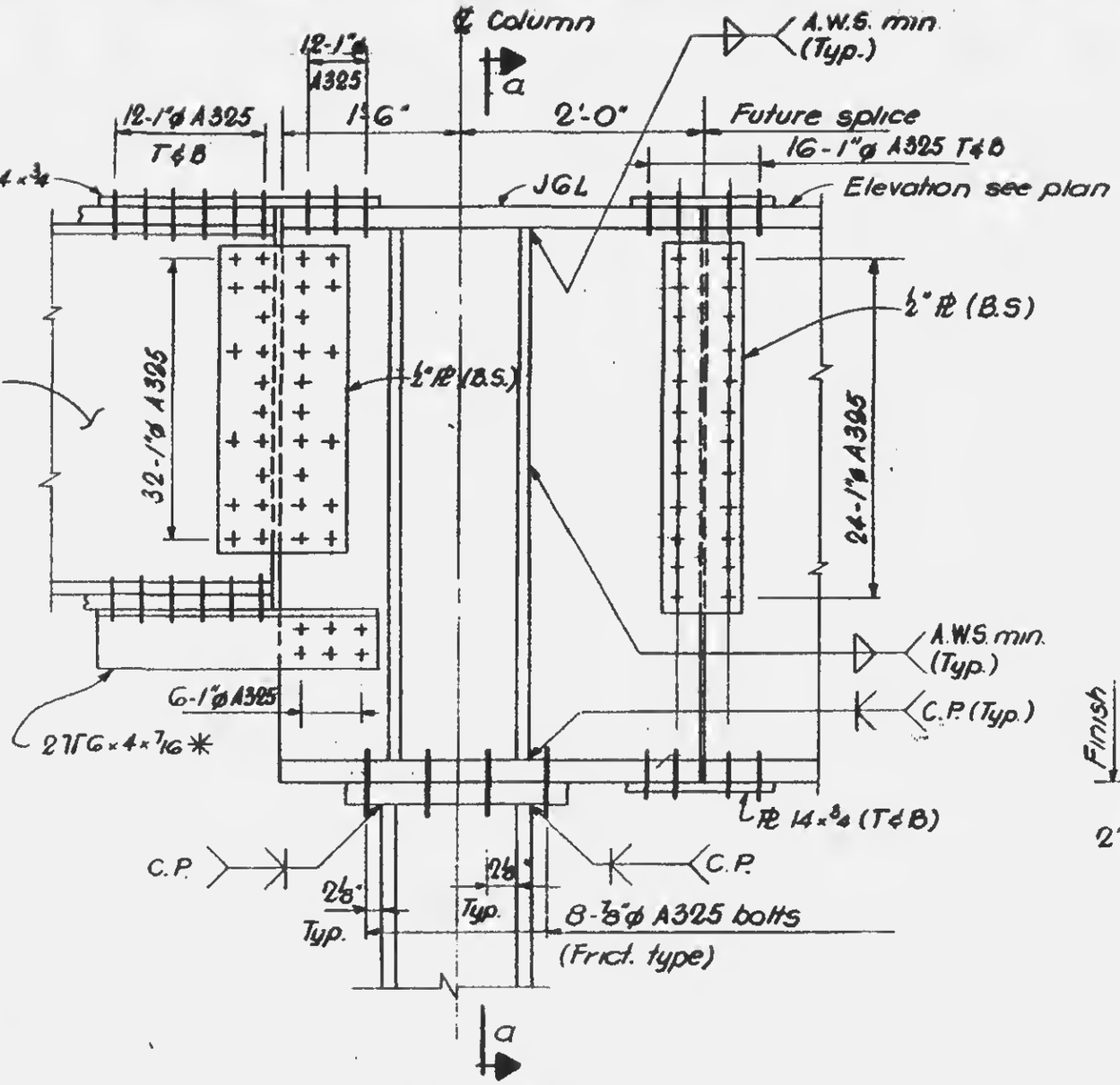




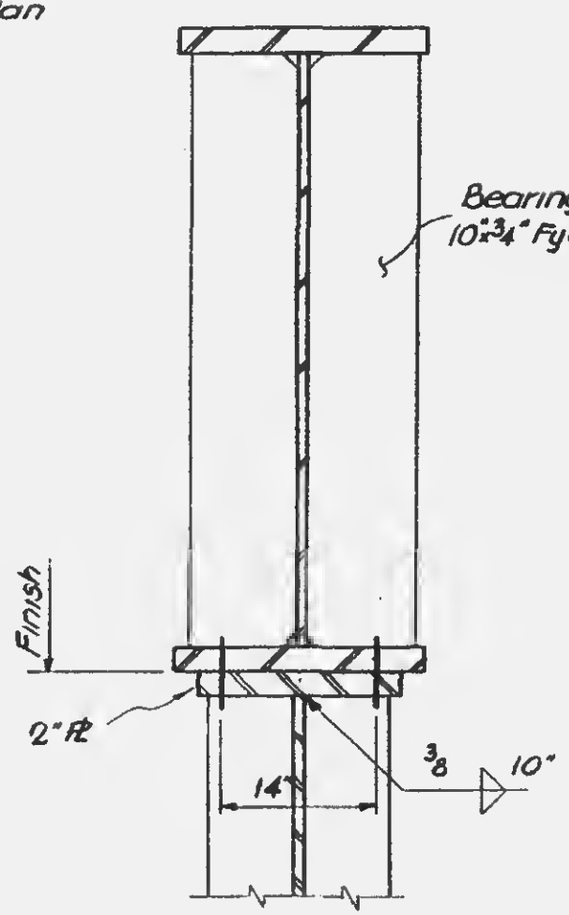
Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
LICENSED TO PRACTICE IN THE STATE OF NEW YORK

12-JK2-128



* Remove 2 ⌐ 6×4 after "future splice" has been completed



Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN G.T.H.

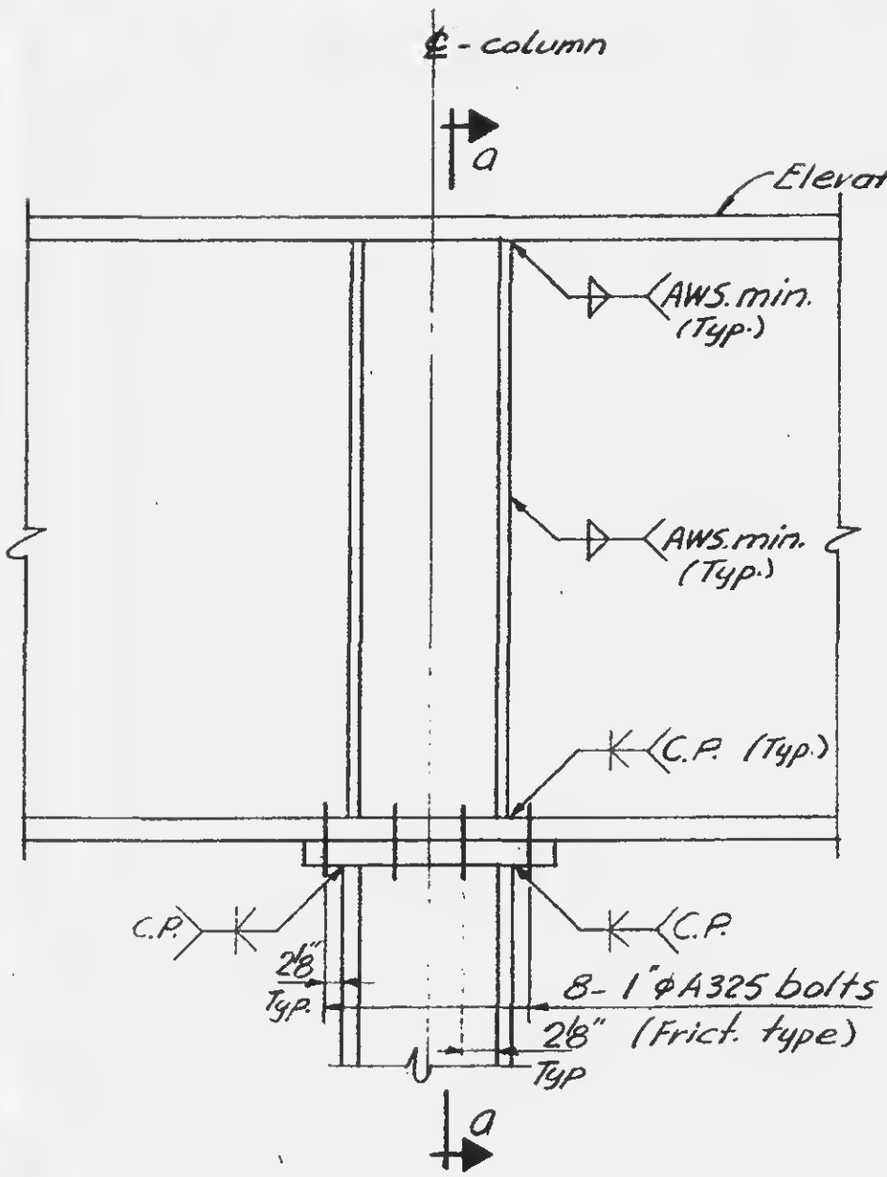
REVIEWED E.L.

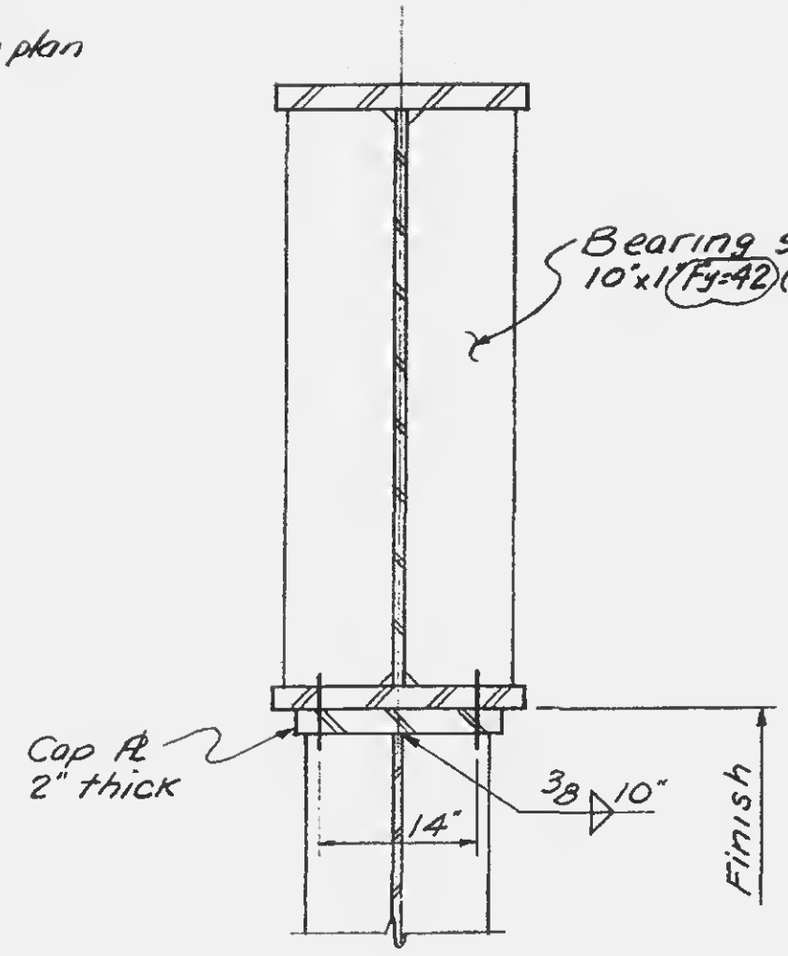
12-JK2-128 A

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — STRUCTURAL ENGINEERS

PROJECT: THE WORLD TRADE CENTER | TITLE: GIRDER CONNECTION DETAIL | DATE: 3-1-68

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Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-129

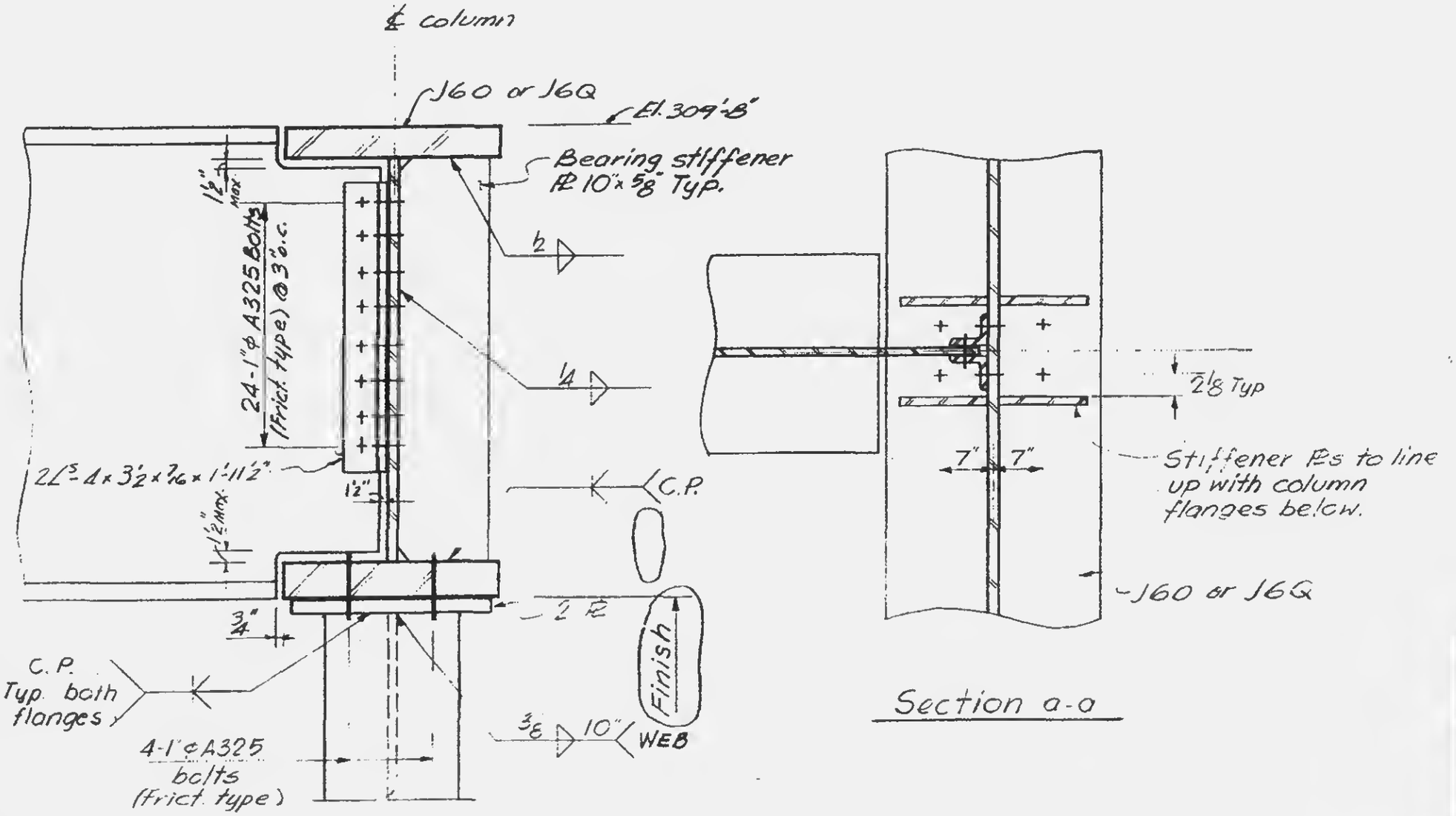
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-68

REVISIONS

6-7-68

6-28-68



Section a-a

Note: Some stiffeners omitted from elevation for clarity. See Sect. a-a

LESLIE E. ROBERTSON PROFESSIONAL ENGINEER No. 34360 UNIVERSITY OF THE STATE OF NEW YORK

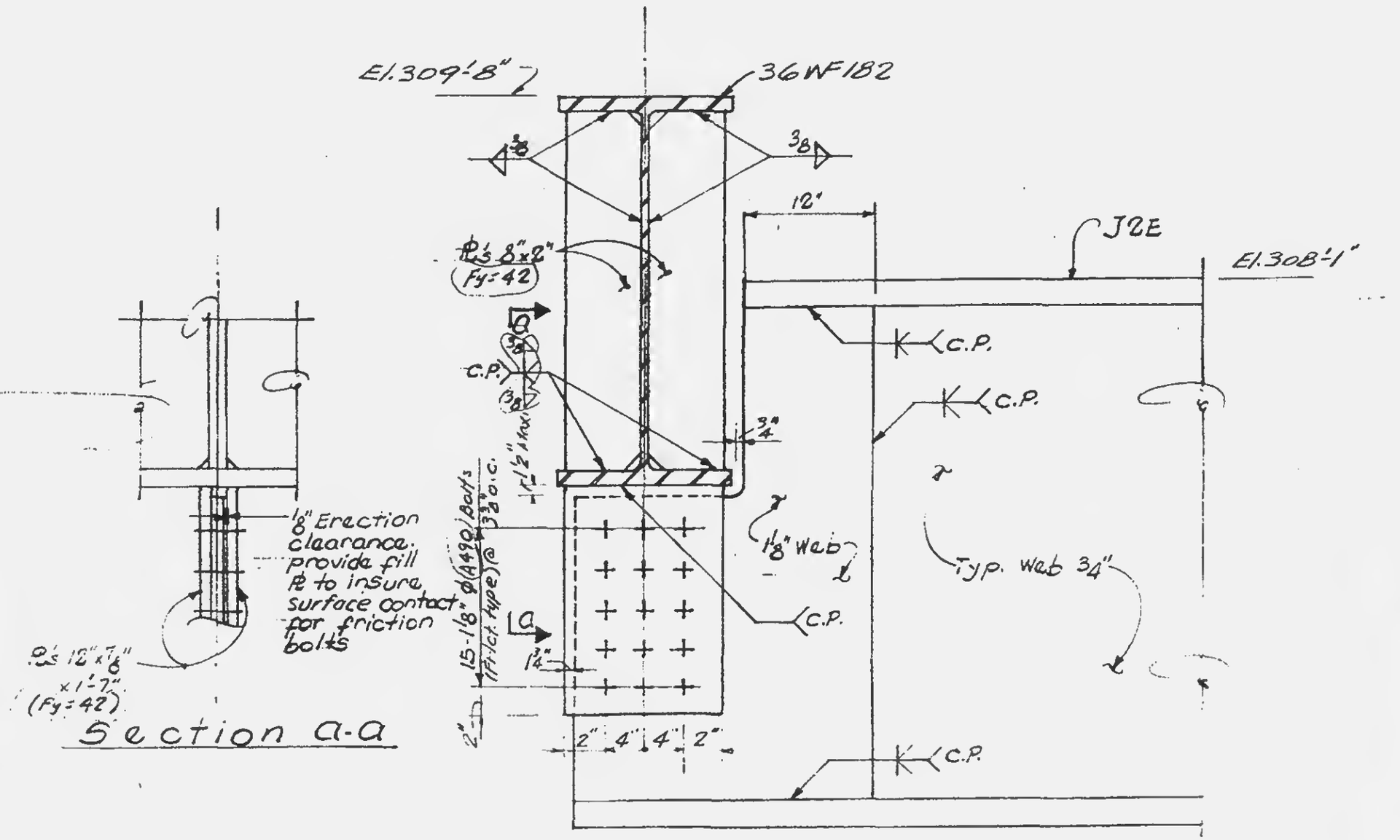
12-JAN-130

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-68

REVISIONS

7-19-68



Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NY

12-JK2-131

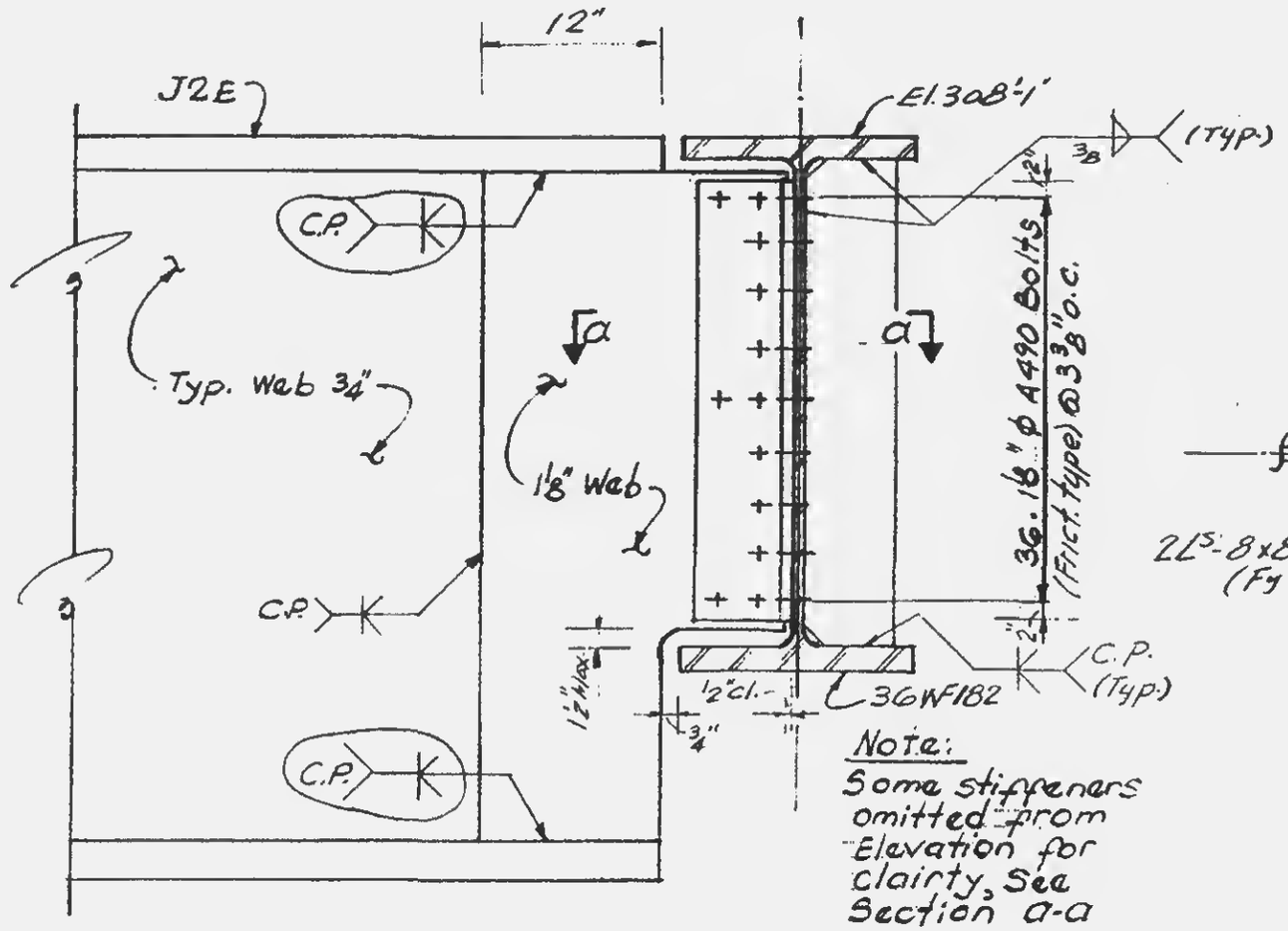
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-68

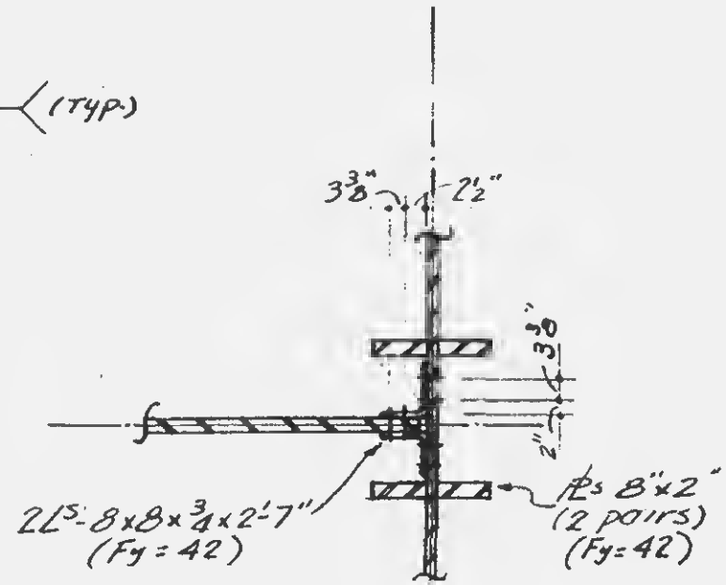
REVISIONS

7-19-68

1-8-69



Note:
Some stiffeners omitted from Elevation for clairty, See Section a-a



Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DRAWN
A.F.

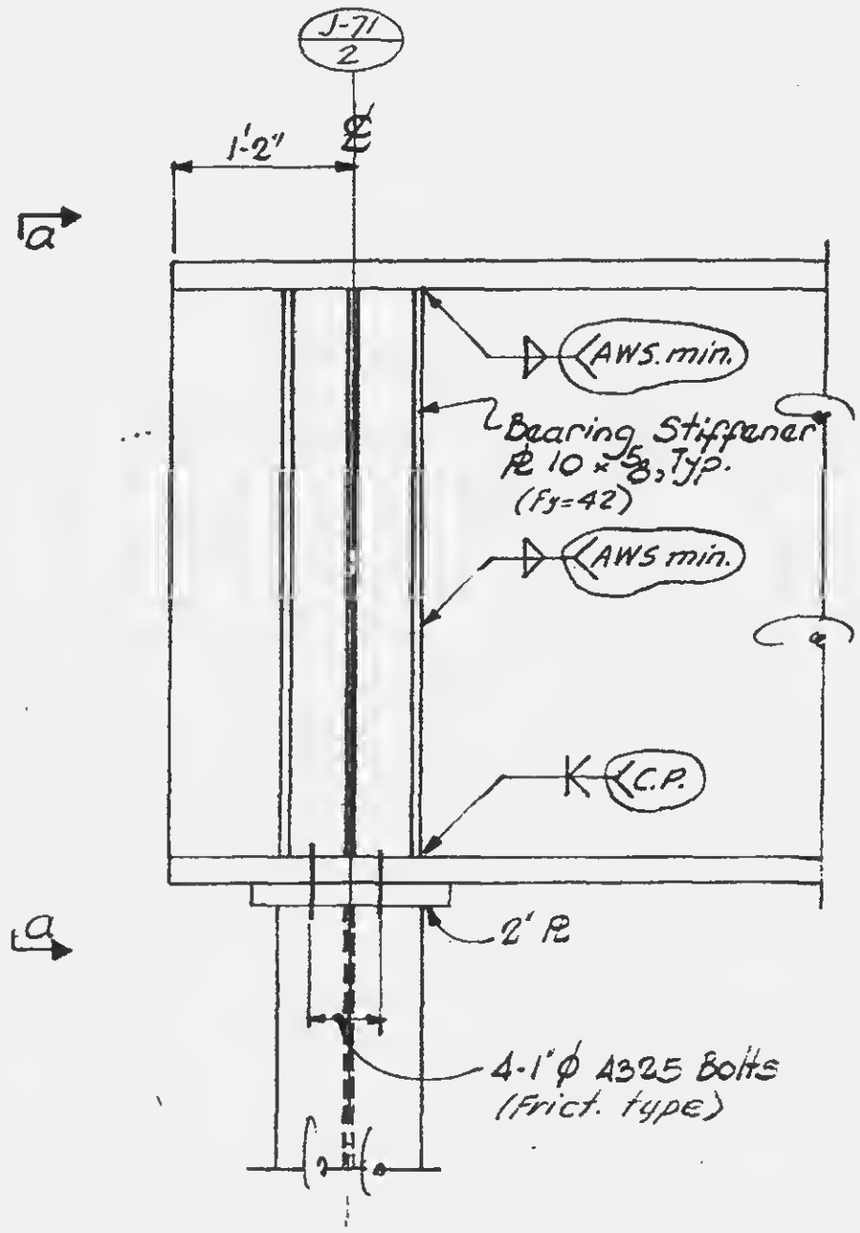
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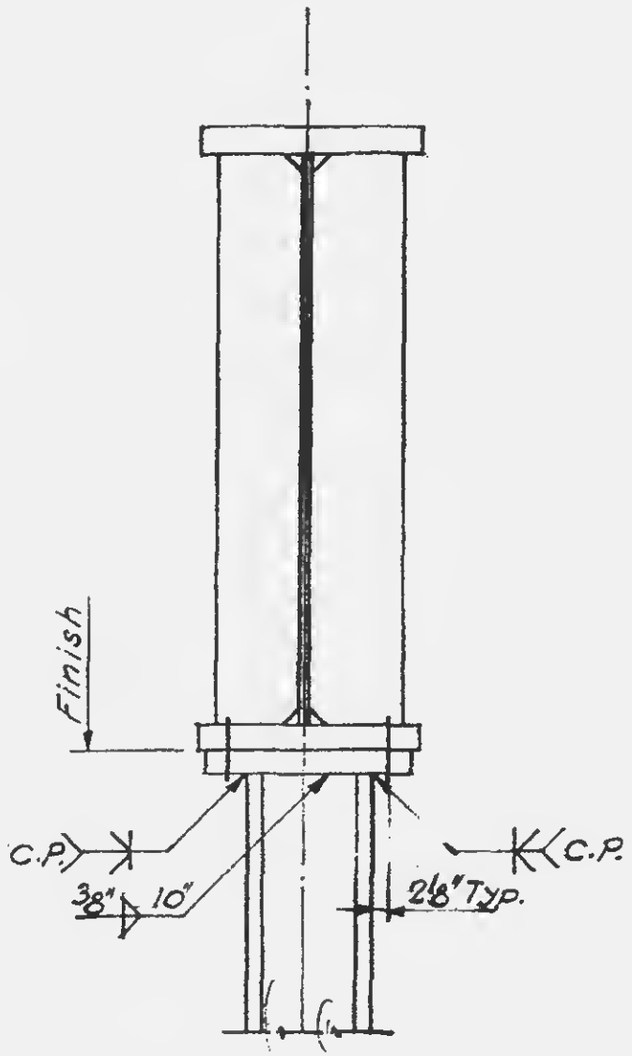
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SKILLING - HELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-68

REVISIONS
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Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DRAWN
A.F.

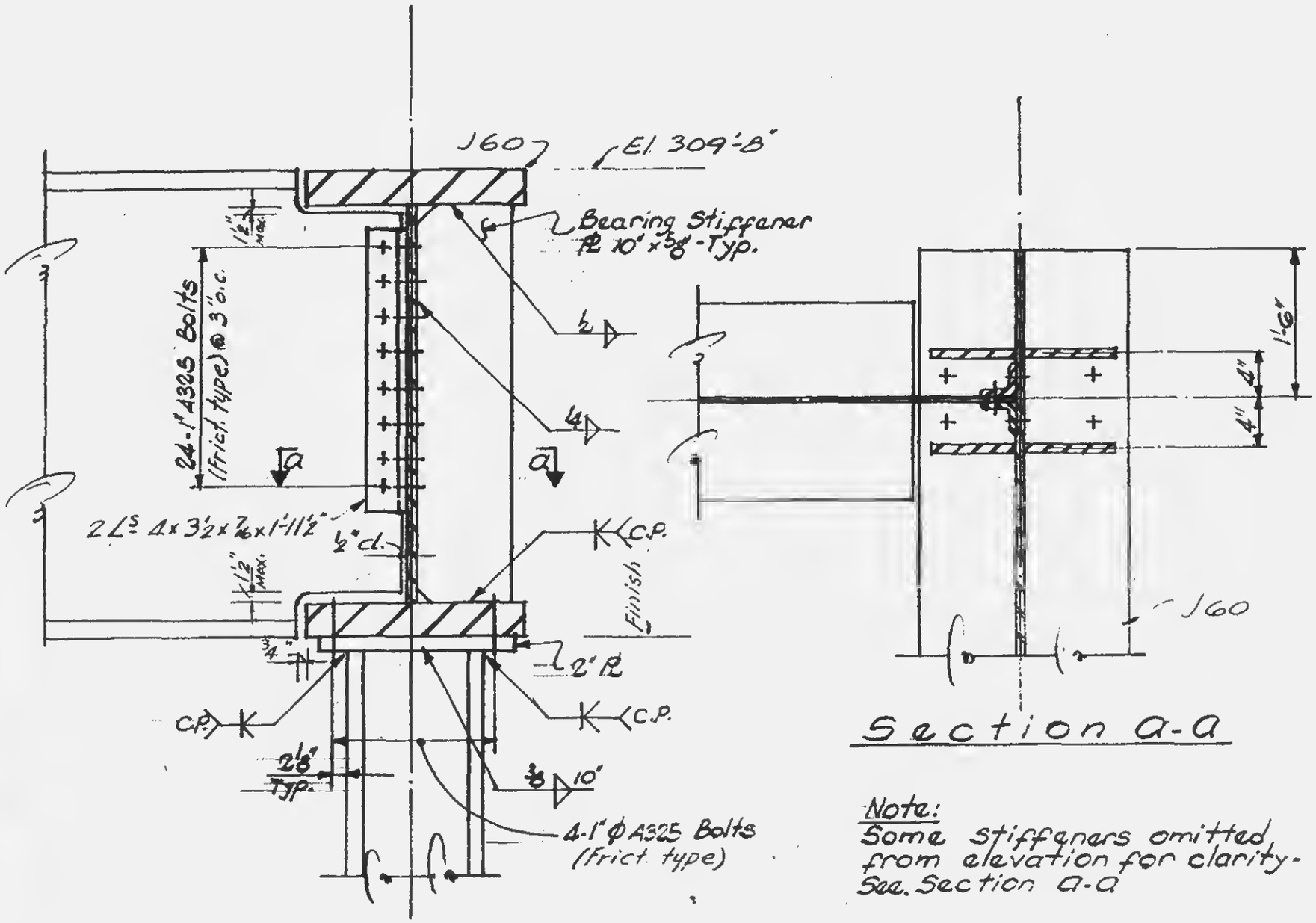
REVIEWED
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12-JA2-133

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-68

REVISIONS



Section a-a

Note:
Some stiffeners omitted from elevation for clarity - See Section a-a

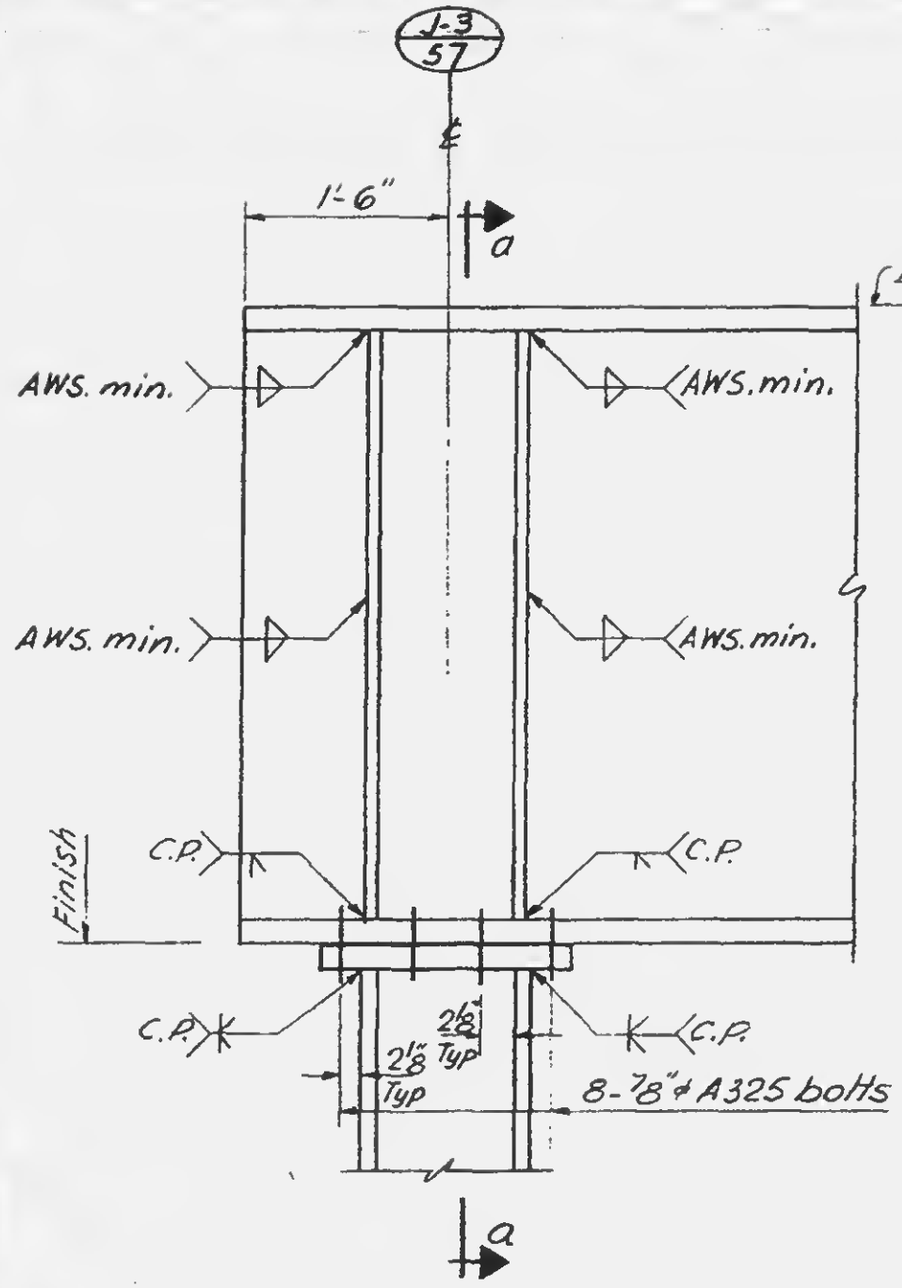
LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON No. 34360 UNIVERSITY OF THE STATE OF NEW YORK

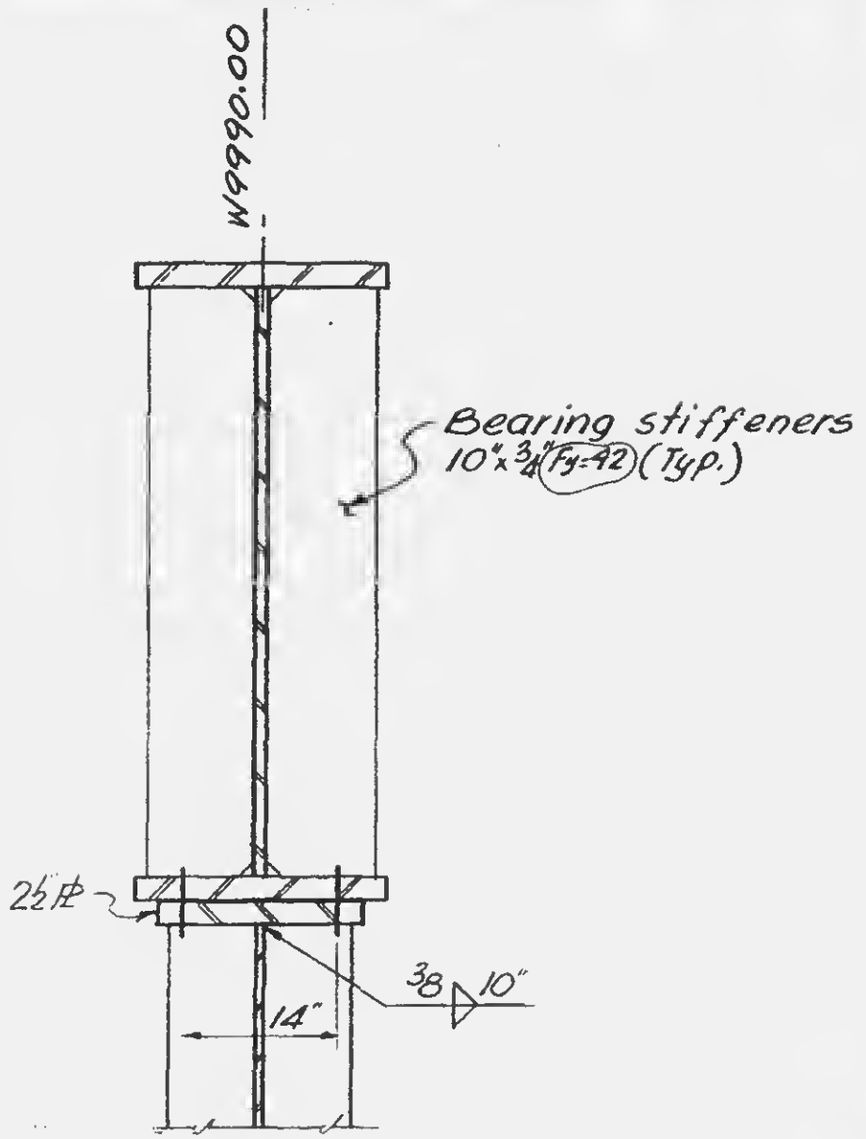
12-JK2-134

STILLING - HELLE - CHRISTIANSEN - ROBERTSON

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER CONNECTION DETAIL | DATE 5-1-68

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Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
THE STATE OF NEW YORK

12-JK2-135

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON

PROJECT THE WORLD TRADE CENTER

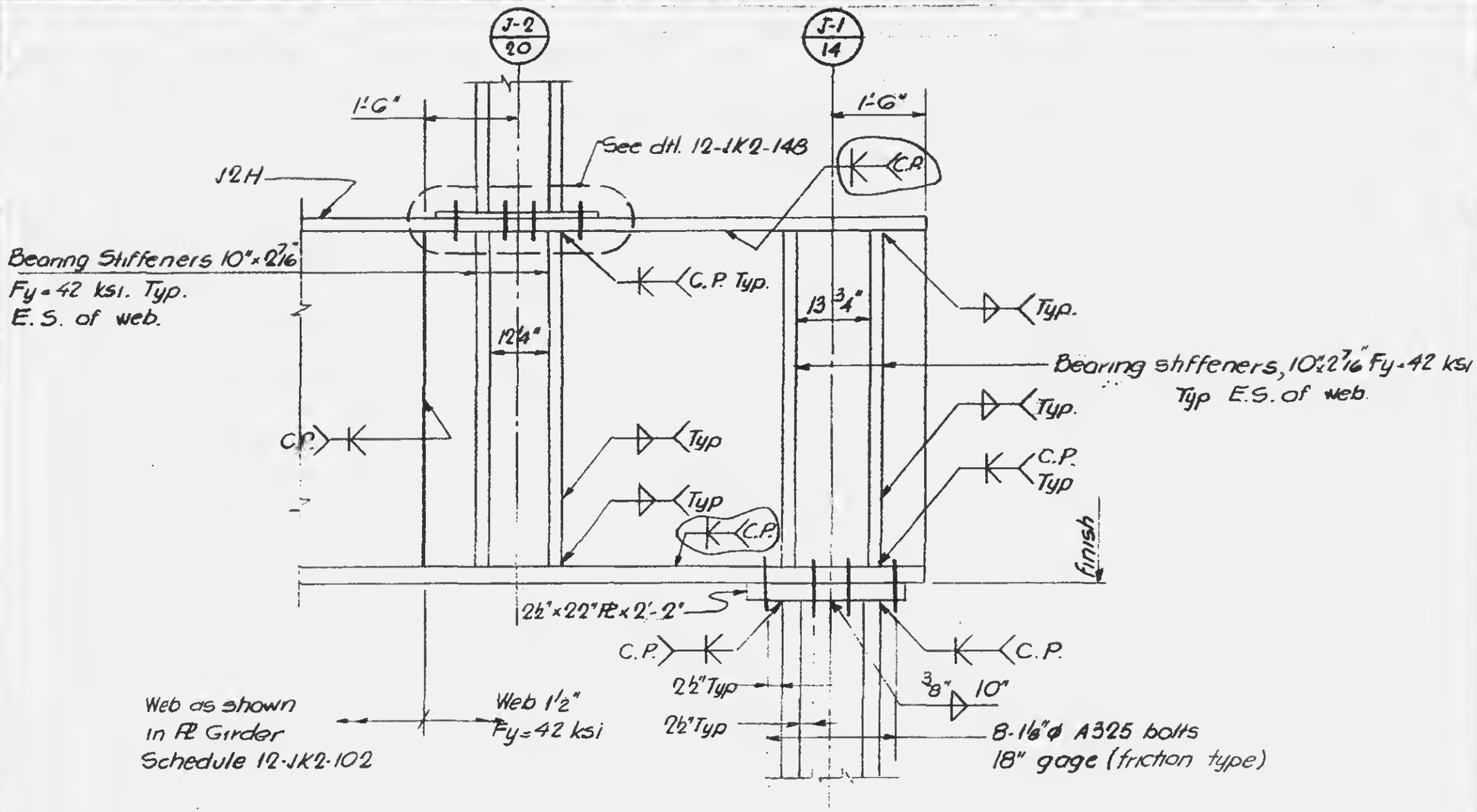
TITLE GIRDER J2H CONNECTION

DATE 6-7-68

REVISIONS

7-19-68

1-8-69



Welds are AISC minimum unless otherwise shown

Ref. dwgs: 12-JK2-102, SJ-75

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DRAWN
A.F.

REVIEWED
E.L.

12-JK2-136

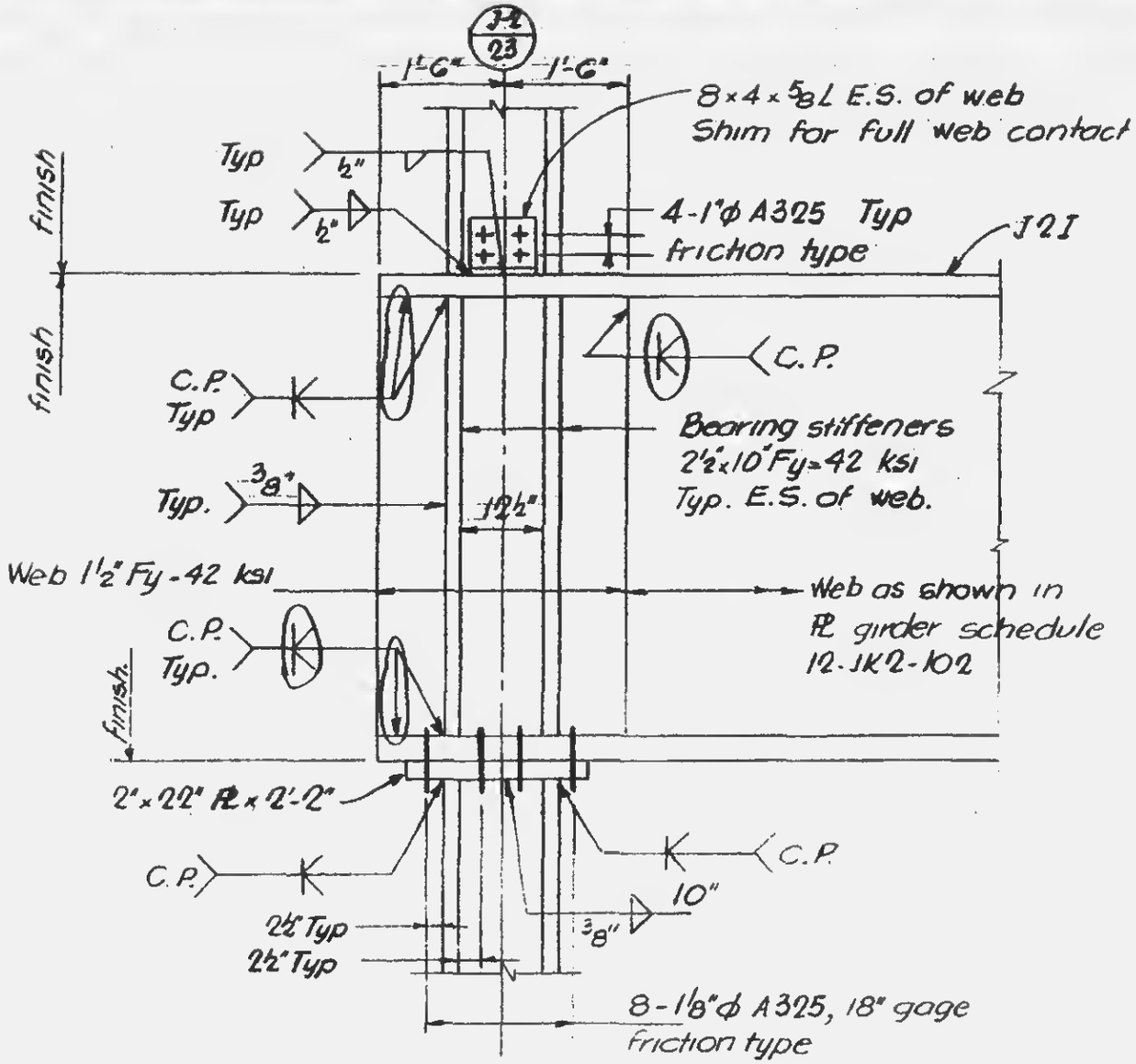
KLEINFELDER - BELLE - CHRISTIANSEN - ROBERTSON — Structural & Civil Engineers

PROJECT: THE HOSPITAL FOR JOINT DISEASES

TITLE: GIRDER J23 - CONNECTION DETAIL

DATE: 6-7-68

REVISIONS
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1-8-69



Ref. dwgs · 12-JK2-102, 51-75

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34960
UNIVERSITY OF THE STATE OF NEW YORK

DRAWN
A.F.

REVIEWED
E.L.

12-JK2-137

PROJECT [illegible]

TITLE GIRDER JAN CONNECTION TO PIER

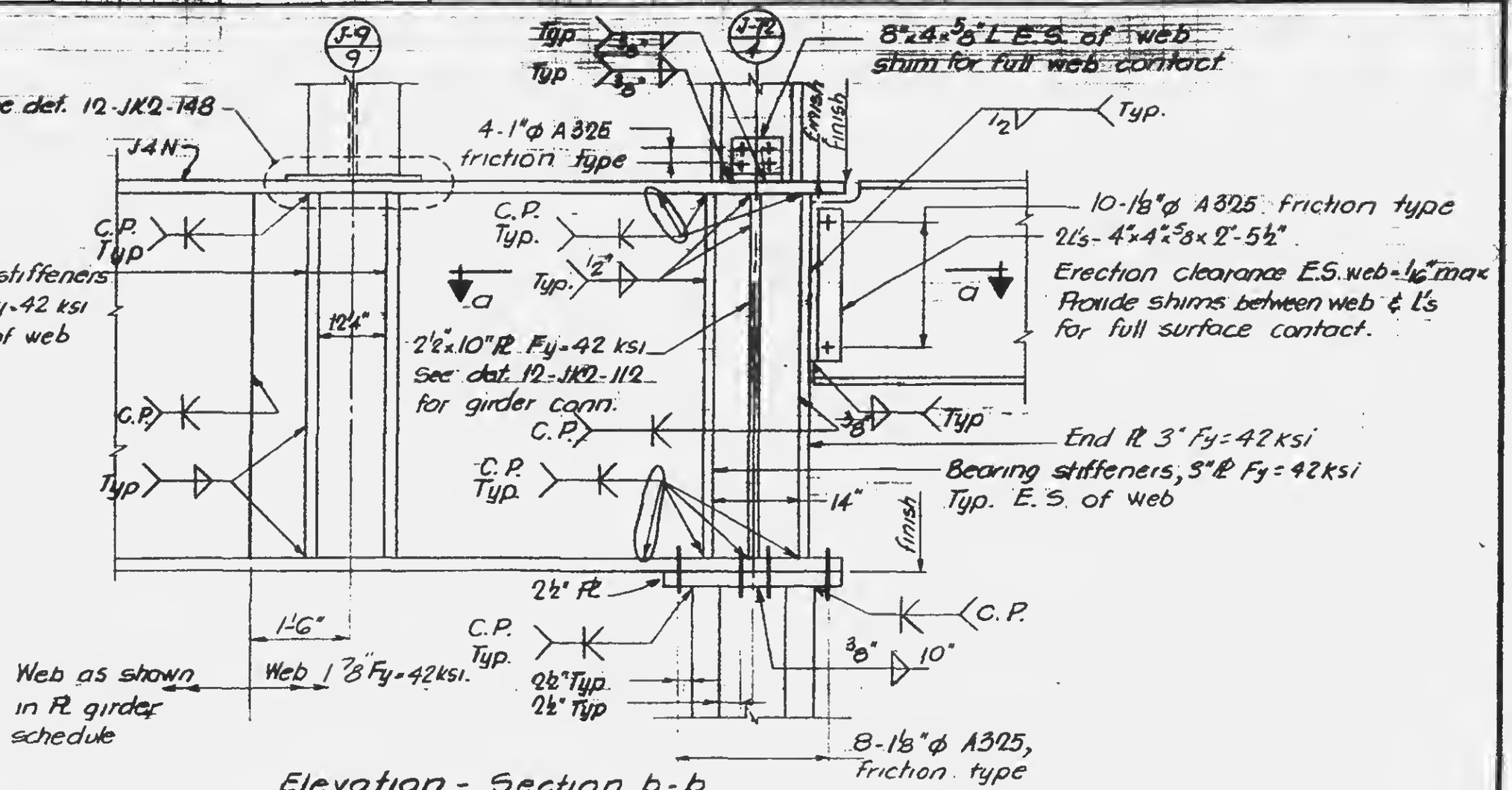
DATE 6-7-68

REVISIONS

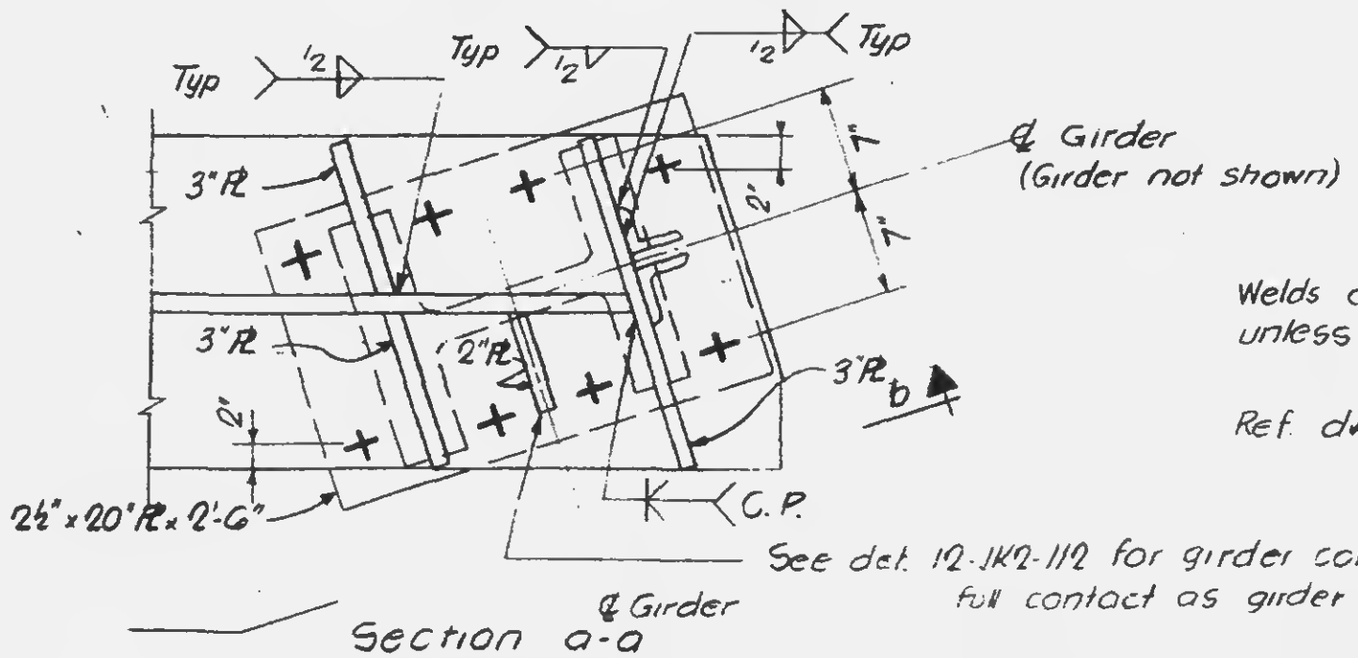
7-19-68

9-4-68

1-8-69



Elevation - Section b-b



Section a-a

Welds are AISC minimum unless otherwise shown

Ref. dwgs: 12-JK2-102, SJ-76

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DRAWN
A.F.

REVIEWED
E.L.

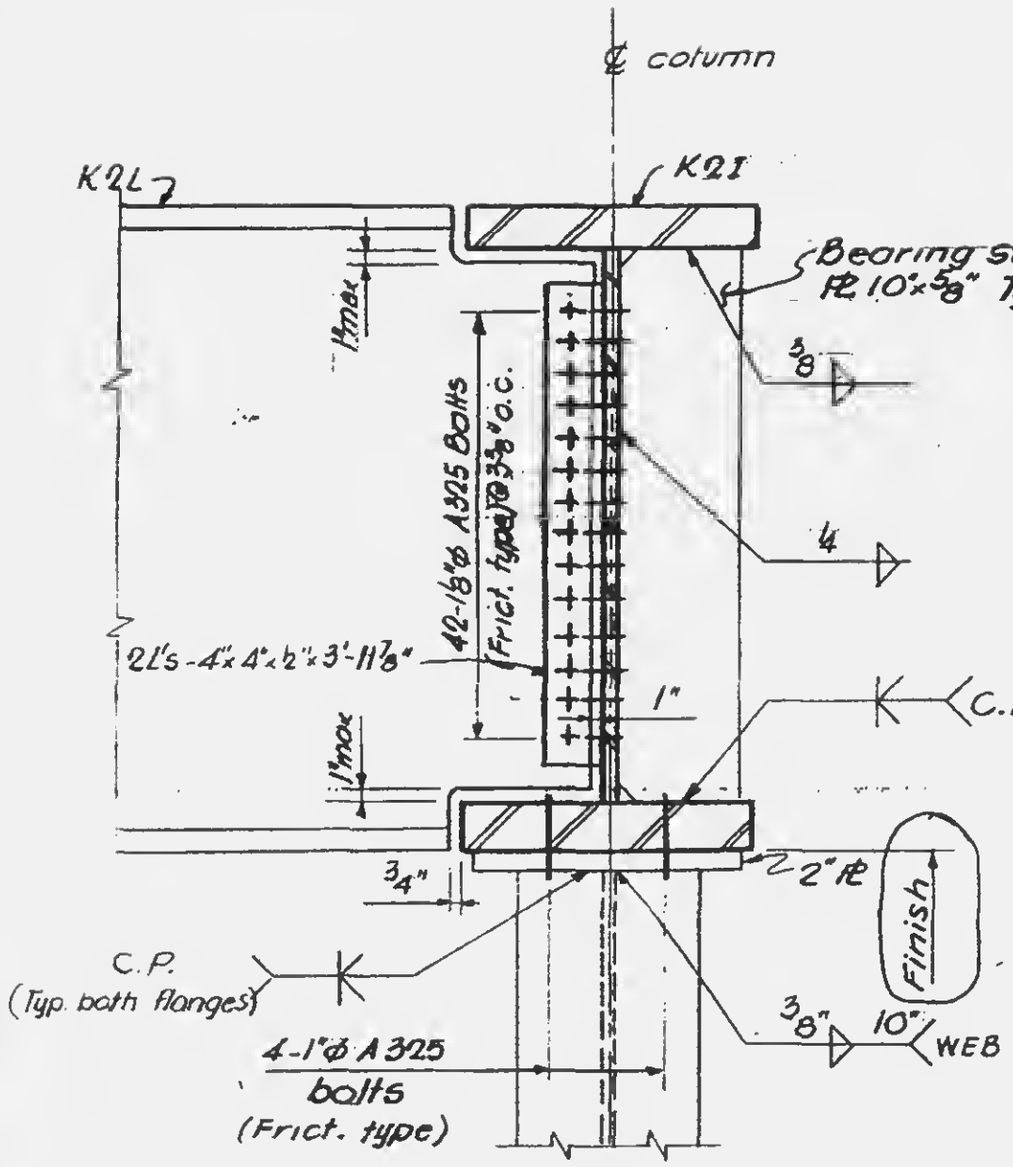
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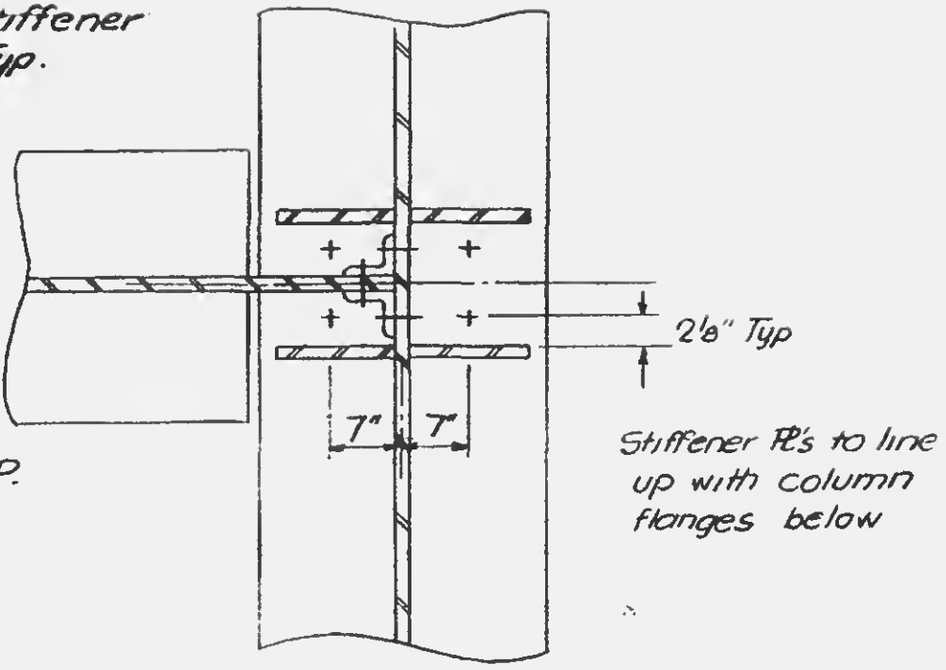
SKILLING - HELLE - CHRISTIANSEN - ROBERTSON

PROJECT THE WORLD TRADE CENTER | TITLE [illegible] | DATE 6-7-68

REVISIONS

6-28-68





Section a-a

Note: Some stiffeners omitted from elevation from clarity. See Sect. a-a

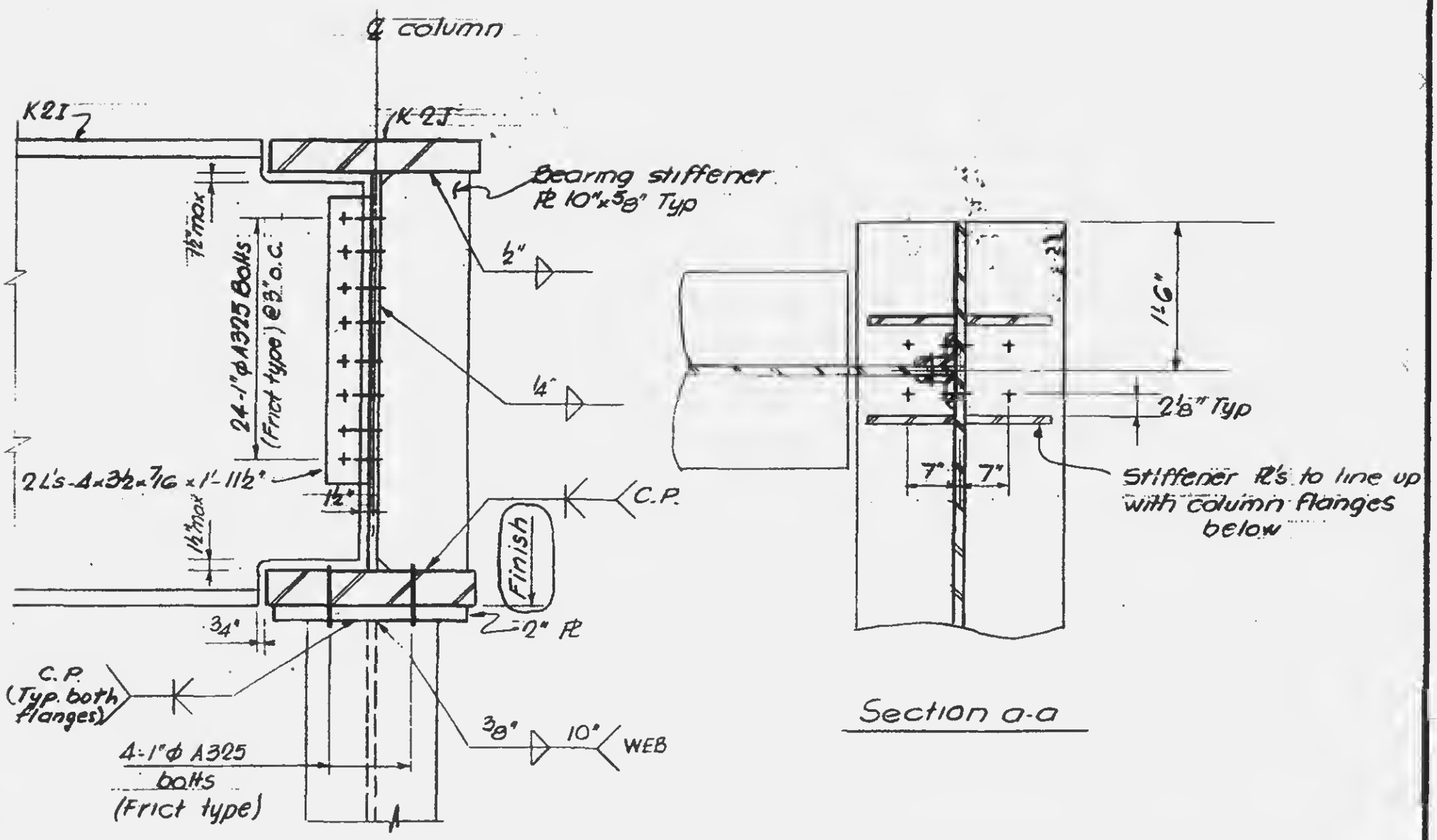
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-139

REVISIONS

6-28-68

DATE 6-7-68



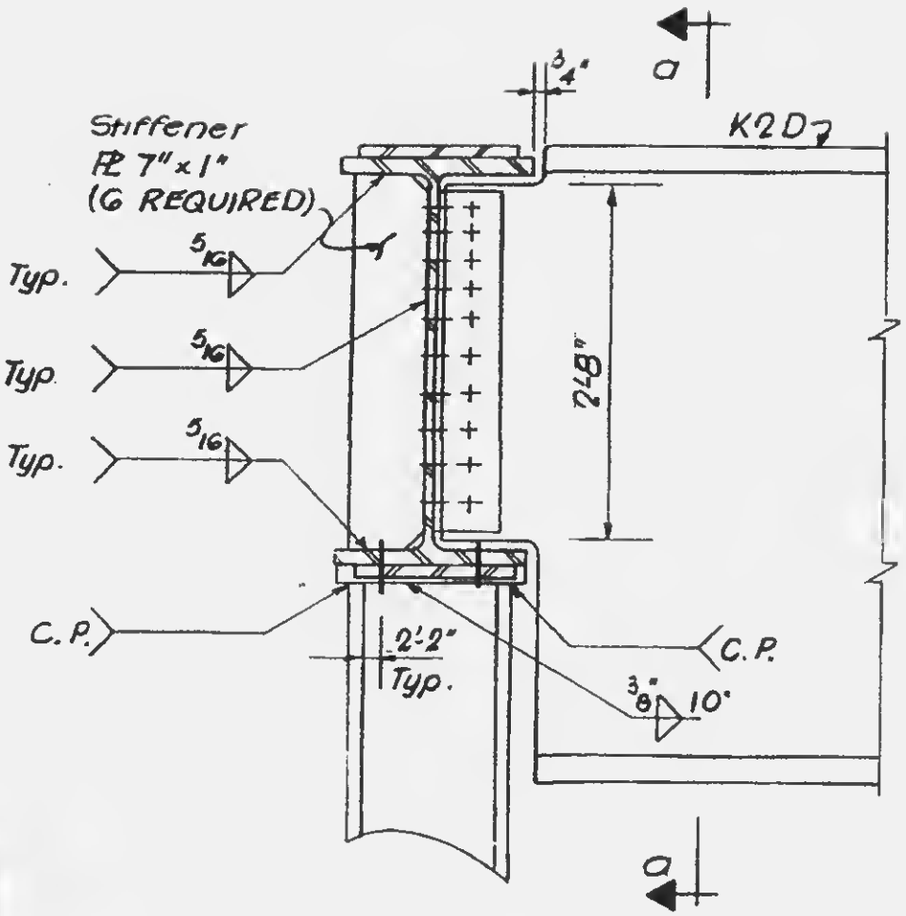
Note: Some stiffeners omitted from elevation for clarity. See Sect. a-a.

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

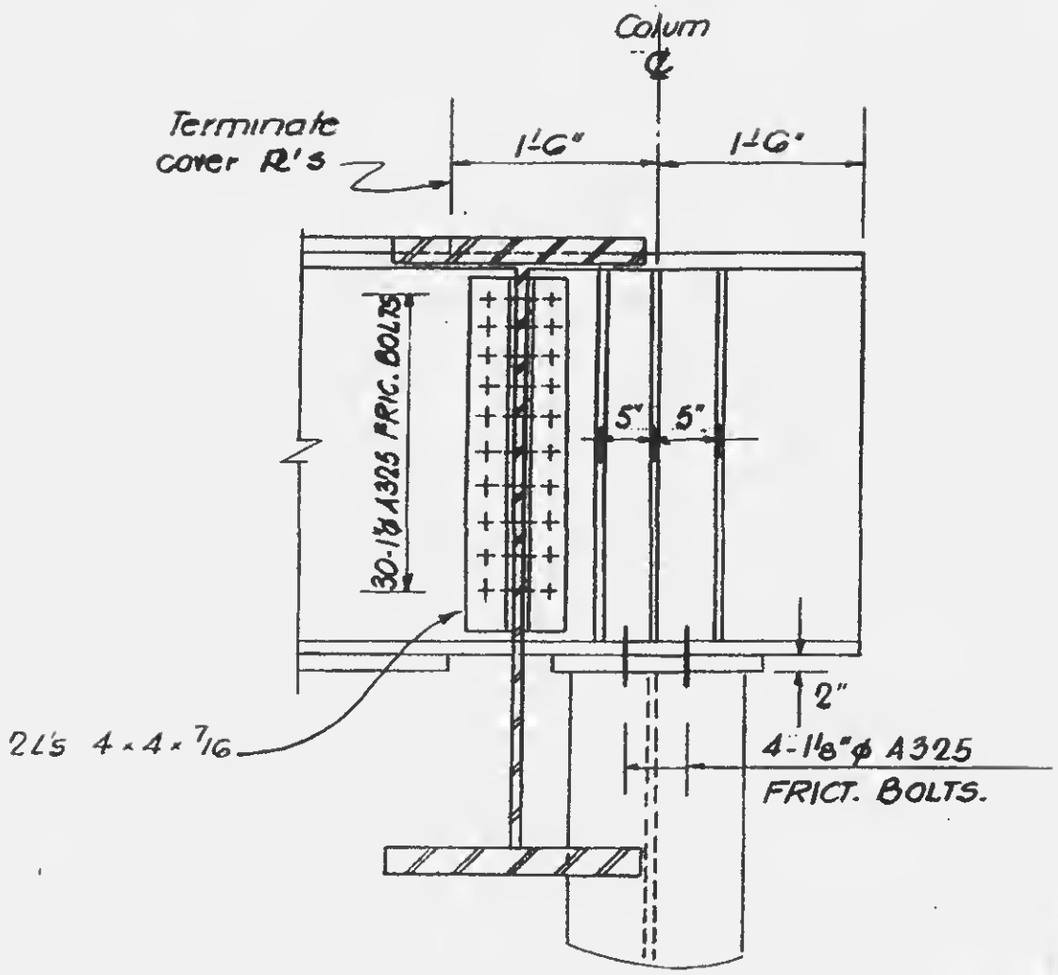
12-1K2-140

REVISIONS

PROJECT THE WORLD TRADE CENTER | TITLE [illegible] COLUMN SPLICE DETAIL | DATE 6-7-68



Elevation



Section a-a

Note : Some stiffeners omitted from elevation for clarity

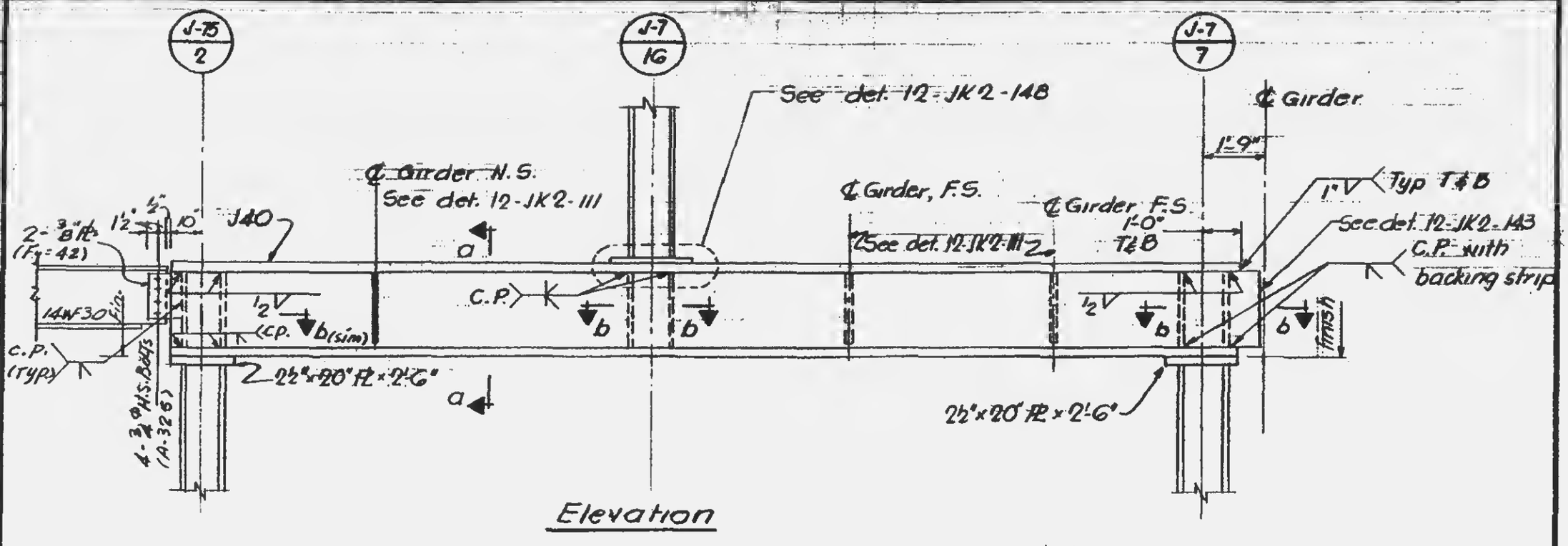
LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

12-JK2-141

KILLING & ROBERTSON

PROJECT [illegible] TITLE [illegible] DATE [illegible]

REVISIONS
7-19-68
1-8-69



Elevation

Section a-a

Section b-b

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DRAWN
A.F.

REVIEWED
E.L.

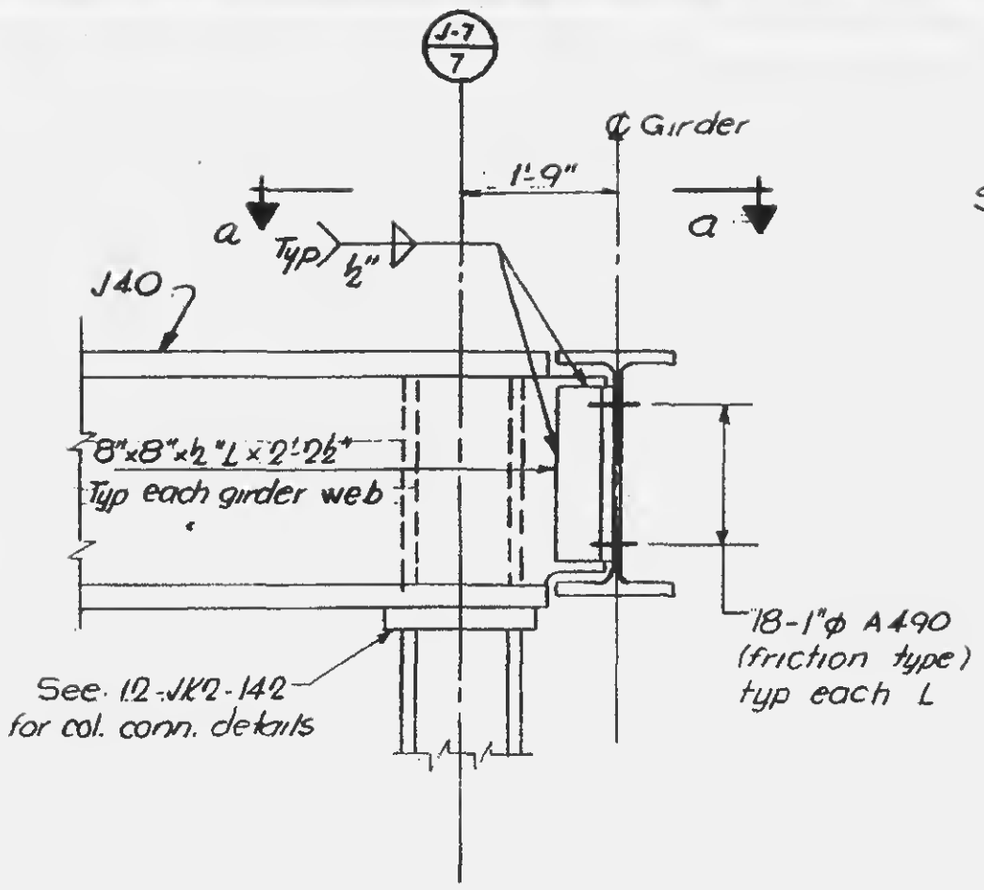
Ref. dwgs SJ-76

12-JK2-142

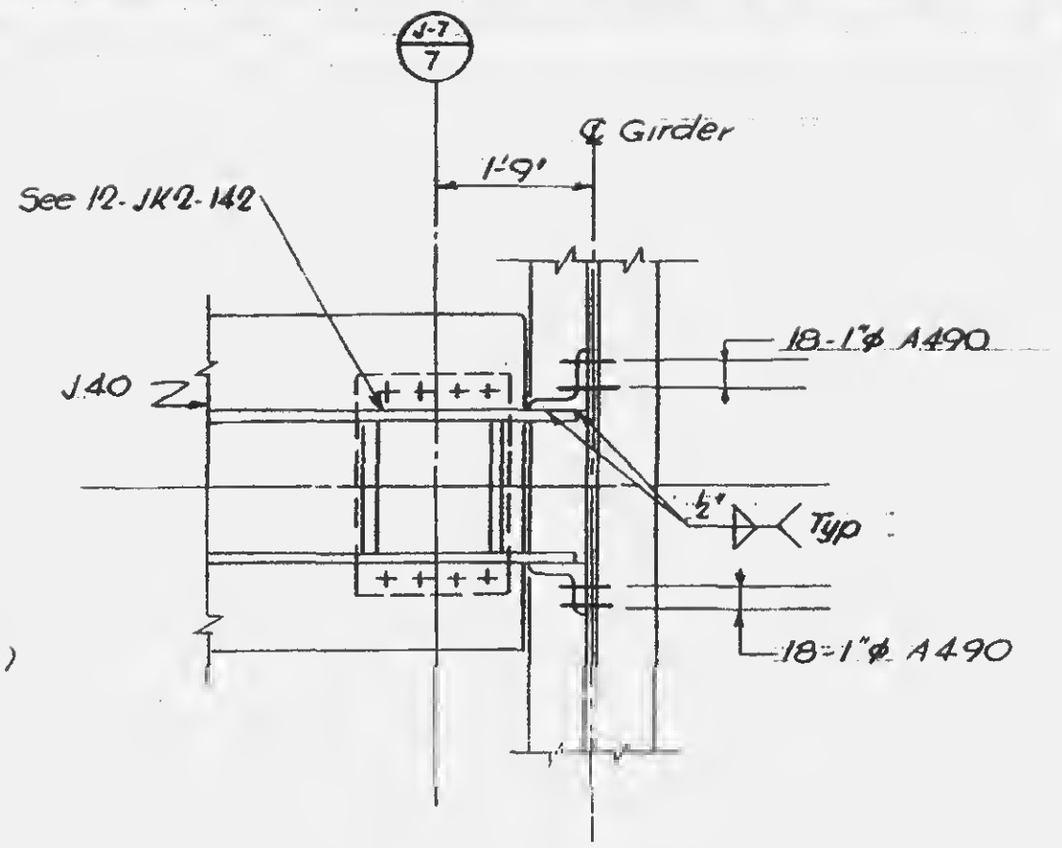
SKILLING, HELLE, CHRISTIANSEN - ROBERTSON

PROJECT: [illegible] TITLE: GIRDER J40 - CONNECTIONS - DETAIL DATE: 6-7-68

REVISIONS

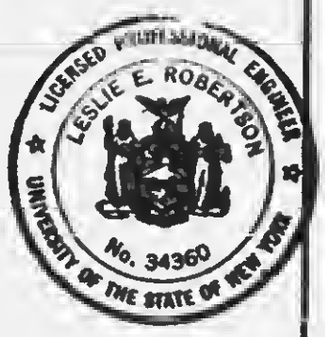


Elevation Section



Plan - Section a-a

Ref. dwgs: 12-JK2-142, SJ-76

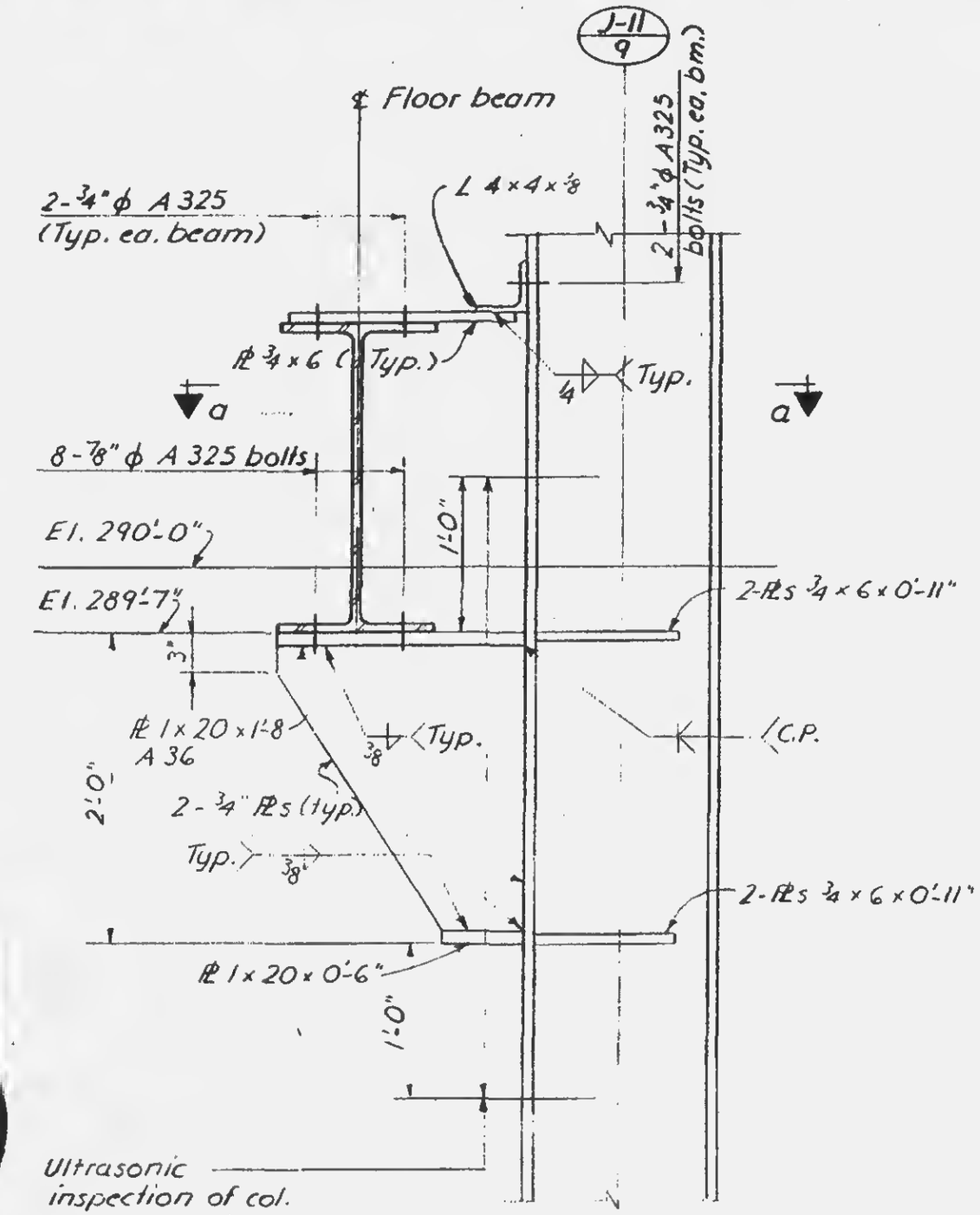


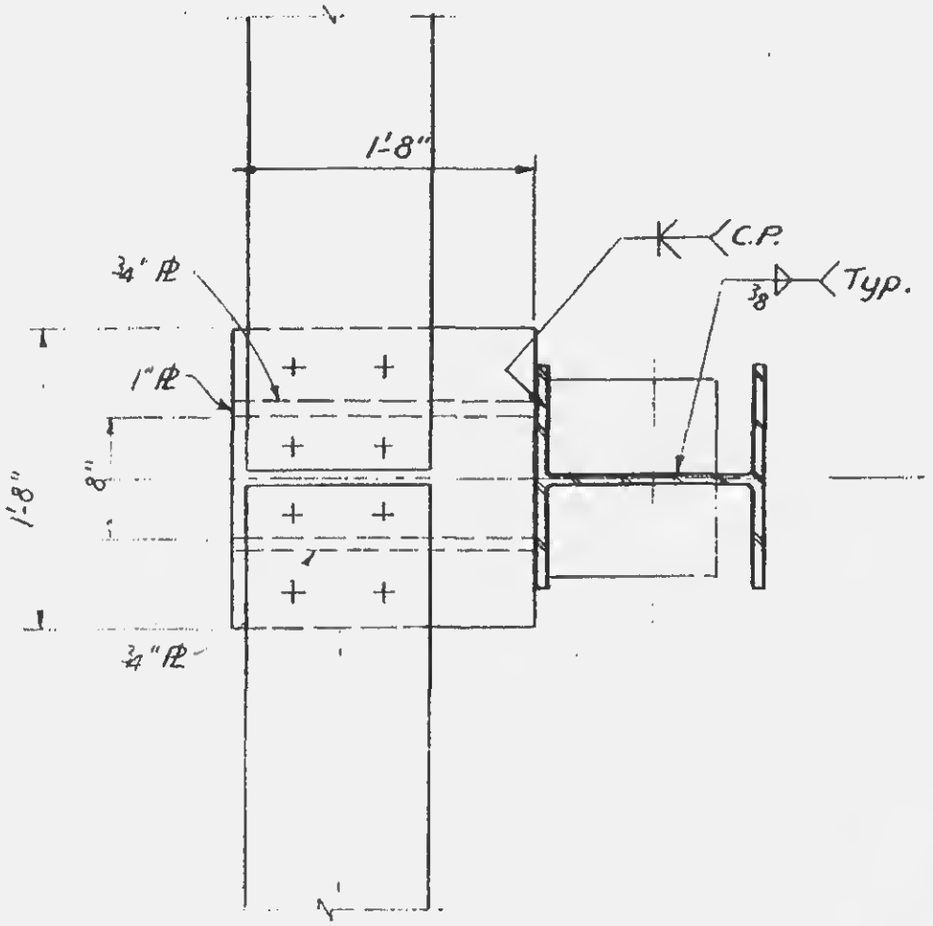
12-JK2-143

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE BEAM CONNECTION DETAIL | DATE 6-7-68

REVISIONS





Section a-a

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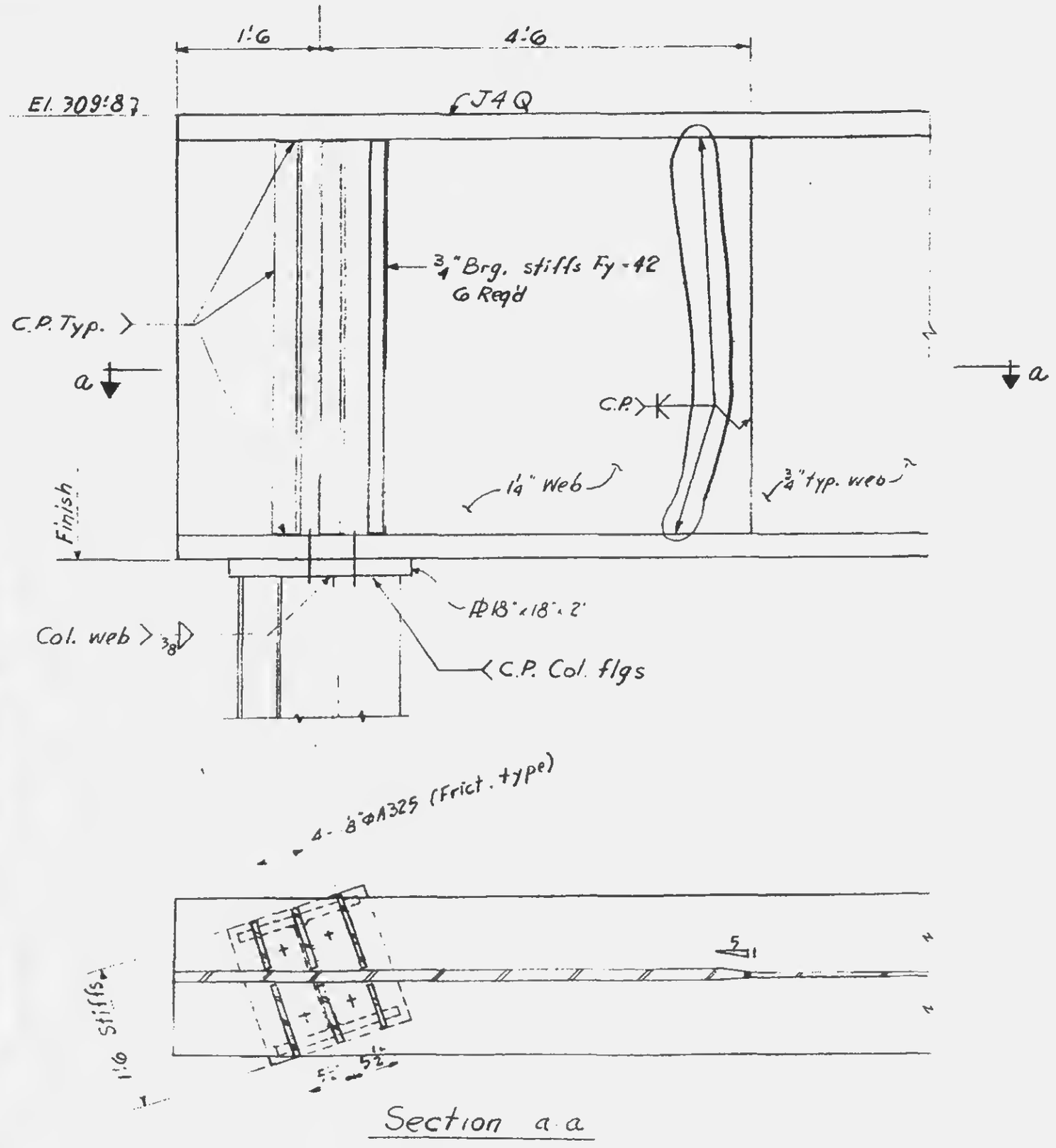
12-JK2-144

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: GIRDER CONNECTION DETAIL | DATE: 9-4-68

REVISIONS

1-8-69



Section a a

LICENSED PROFESSIONAL ENGINEER
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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN A.F.

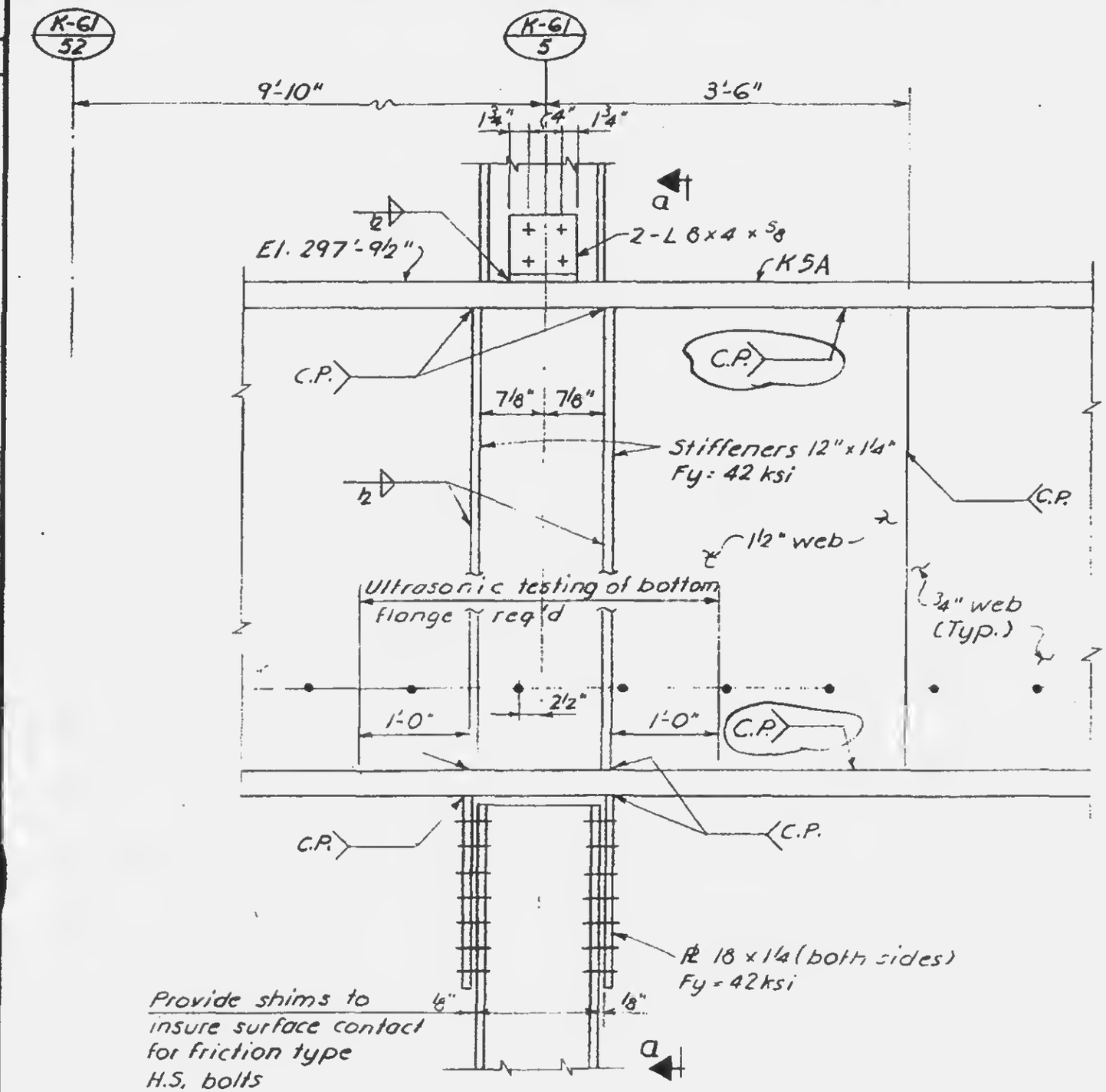
REVIEWED E.L.

12-JK2-145

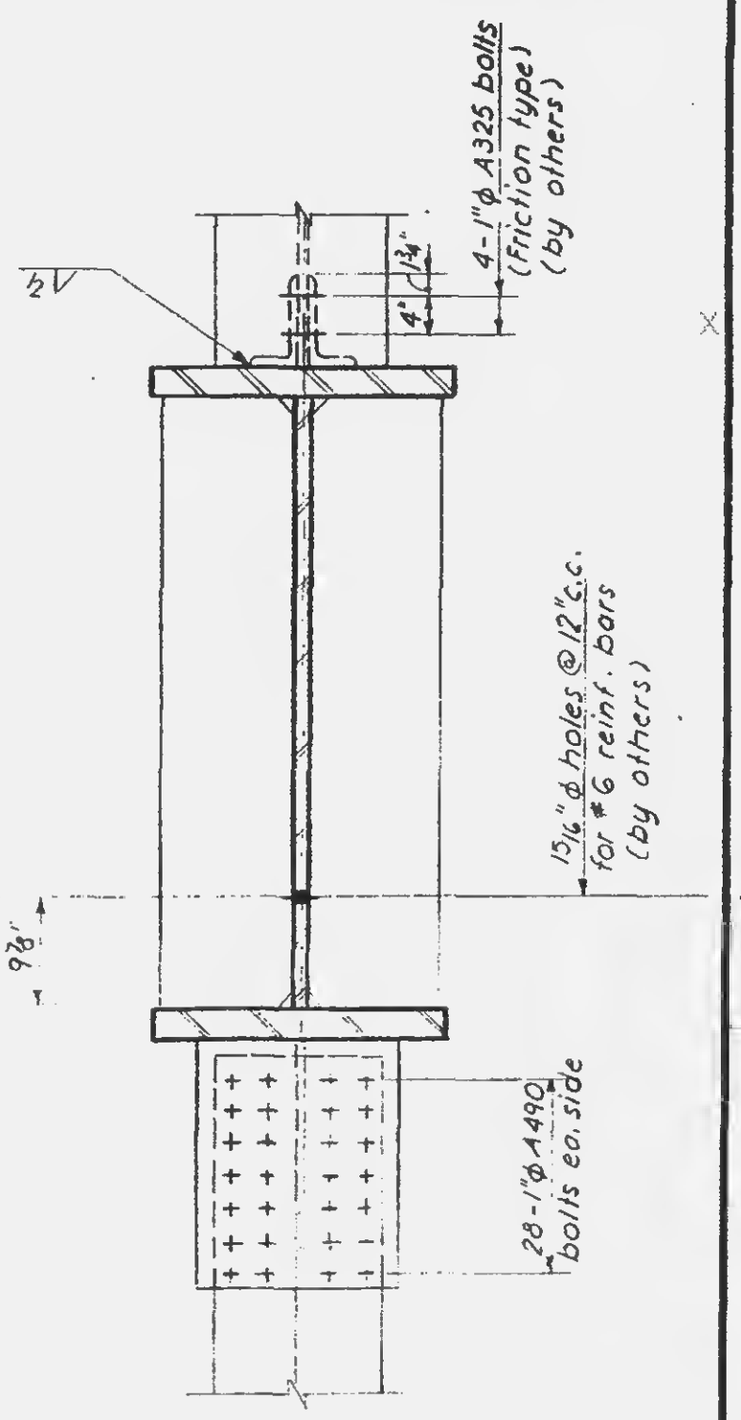
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 9-4-68

REVISIONS
1-8-69



Elevation



Section a-a

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DESIGNED

DRAWN: A.F.

REVIEWED: F.L

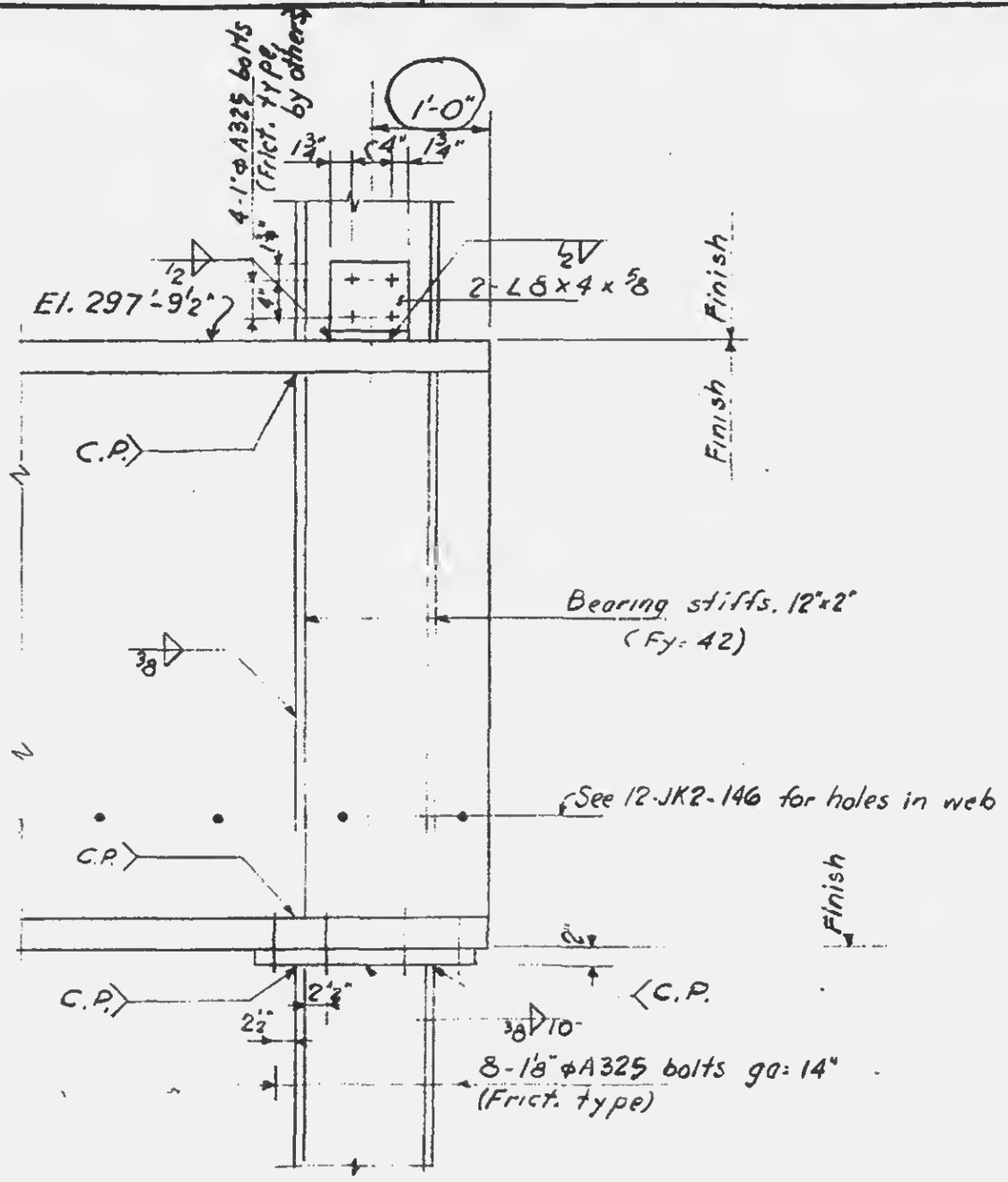
12-JK2-146

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 9-4-68

REVISIONS

10-15-68



LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN

REVIEWED

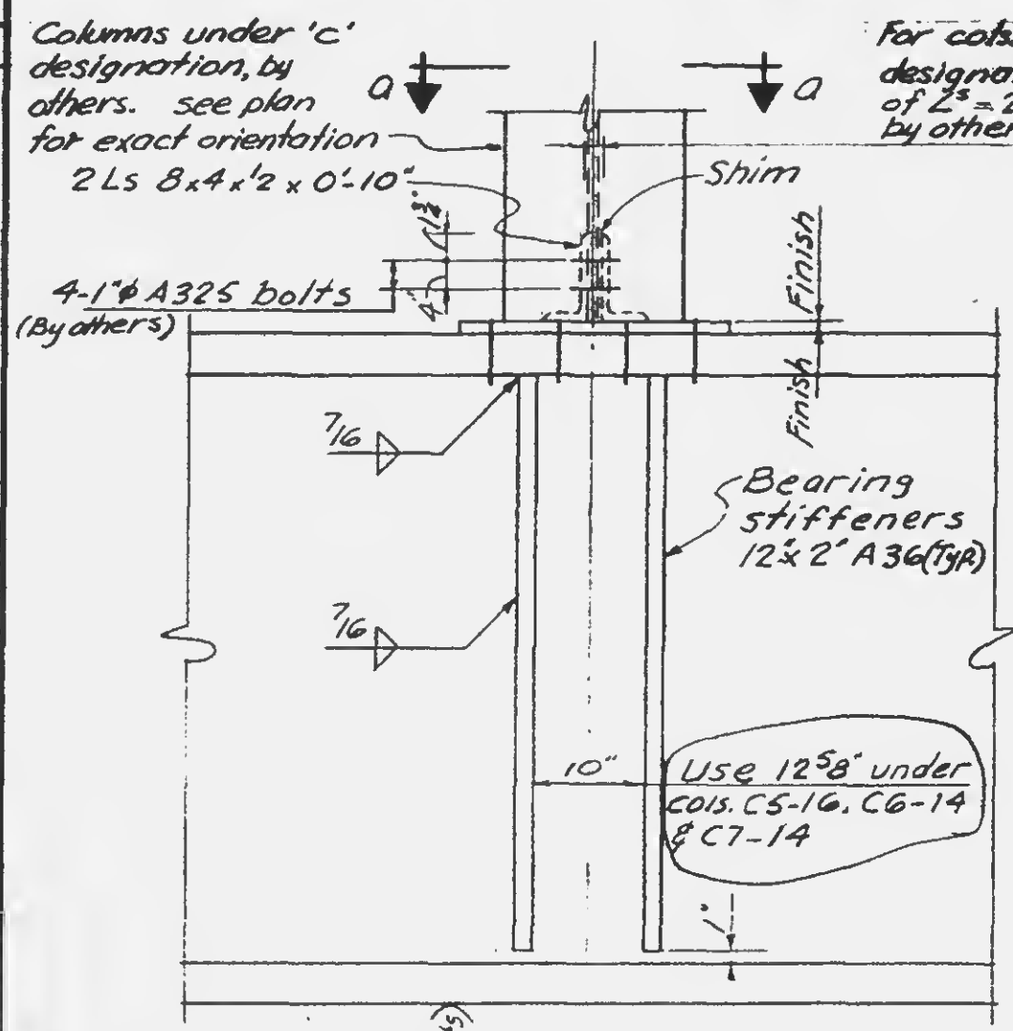
12-JK2-147

SKILLING - HELLE - CHRISTIANSEN - ROBERTSON Structural & Civil Engineers

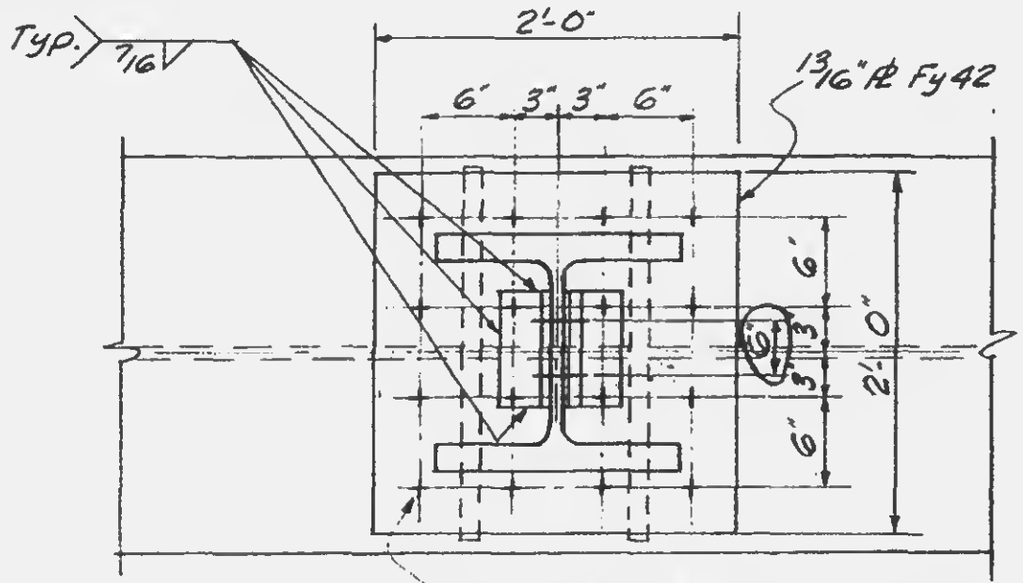
PROJECT THE WORLD TRADE CENTER | TITLE COLUMN CONNECTION DETAIL | DATE 5-1-68

REVISIONS

9-4-68



Detail 1



C50L High tensile huck bolts 7/8"ϕ (90° countersunk) See Det. 1. Bolts to be tightened from one end of ℄ toward the other to insure surface contact between Ps.

Section a-a

LICENSED PROFESSIONAL ENGINEER LESLIE E. ROBERTSON No. 34360 STATE OF NEW YORK

12-JK2-148

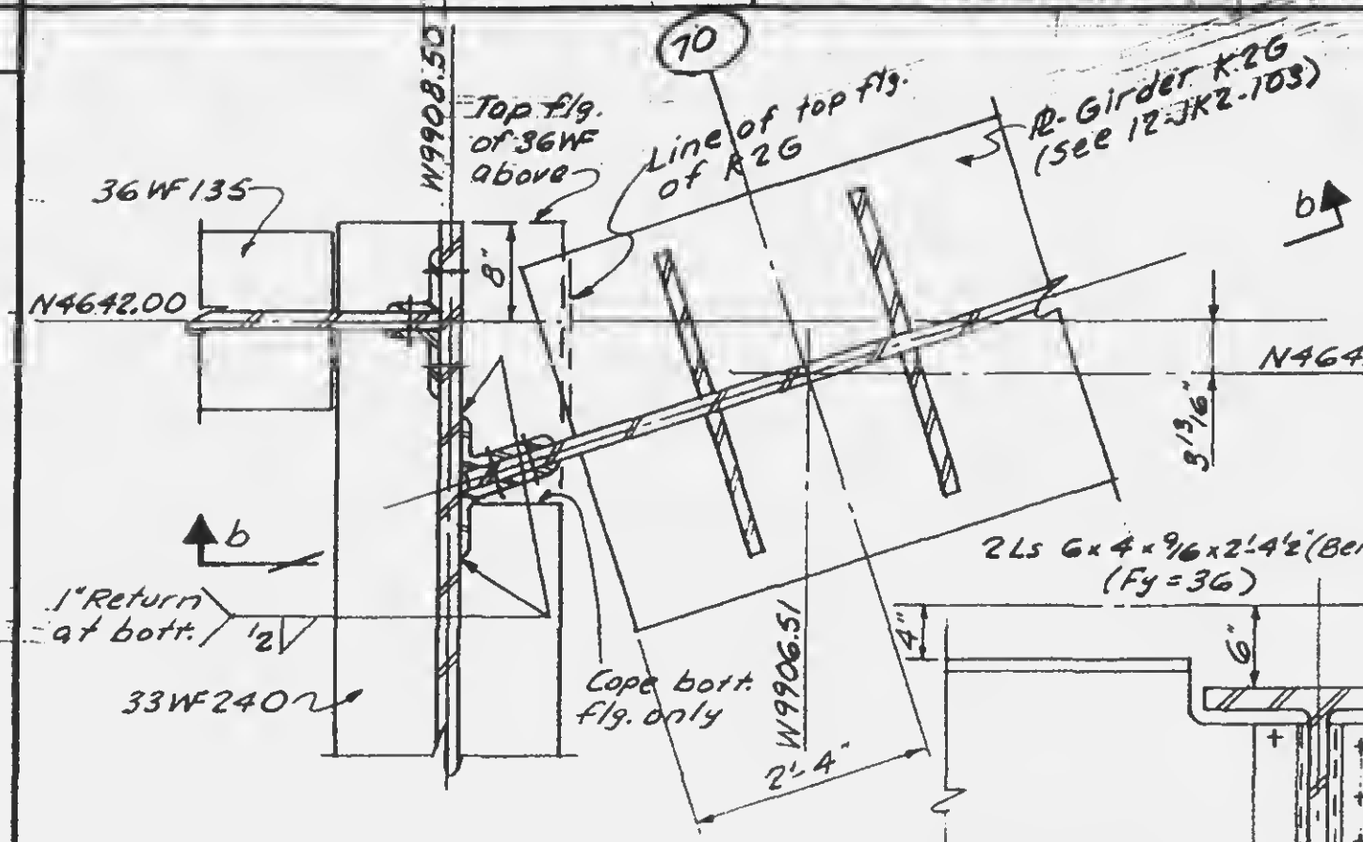
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

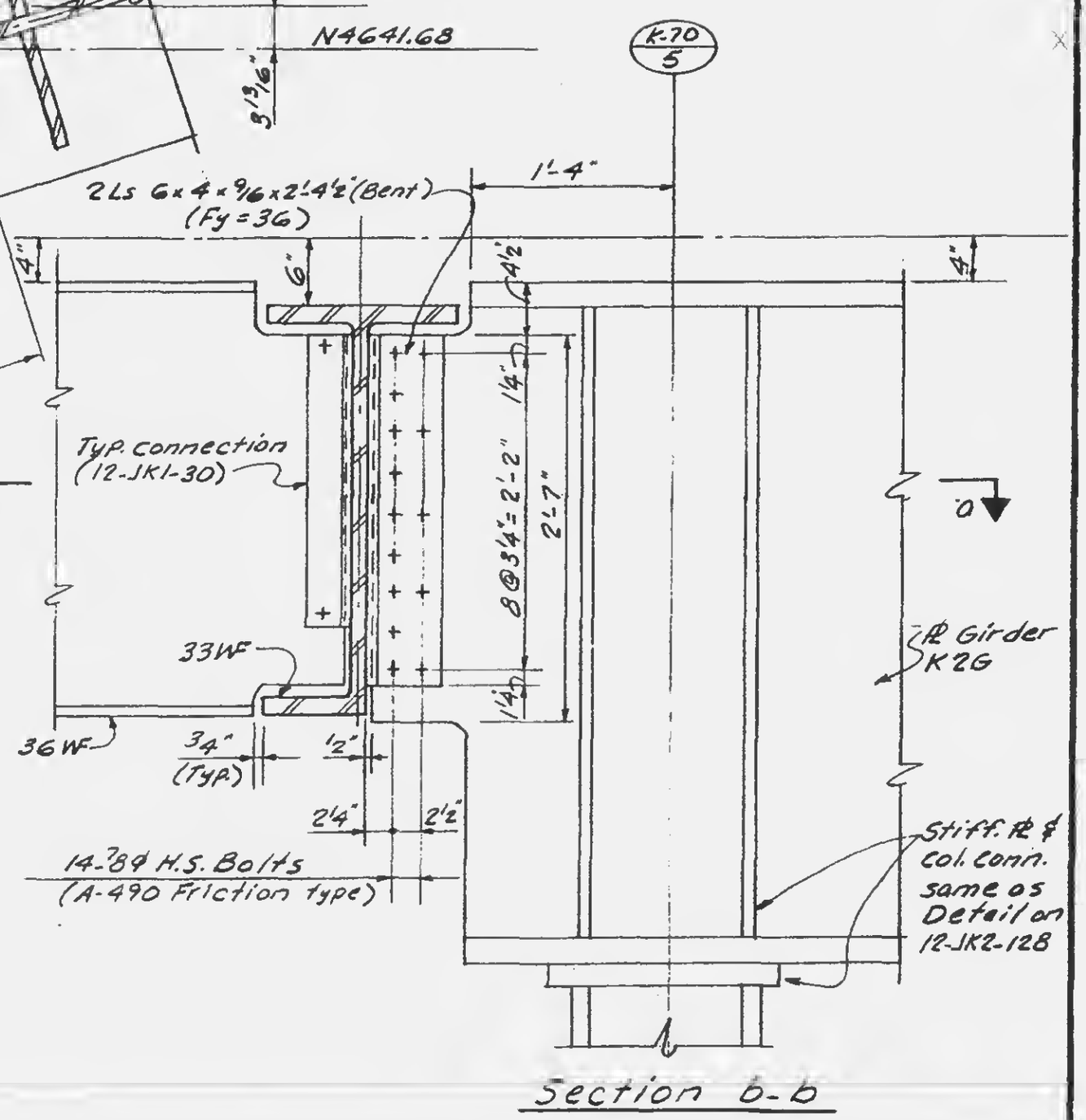
PROJECT: THE WORLD TRADE CENTER

TITLE: GIRDER CONNECTION DETAILS

DATE: 10-15-68

REVISIONS





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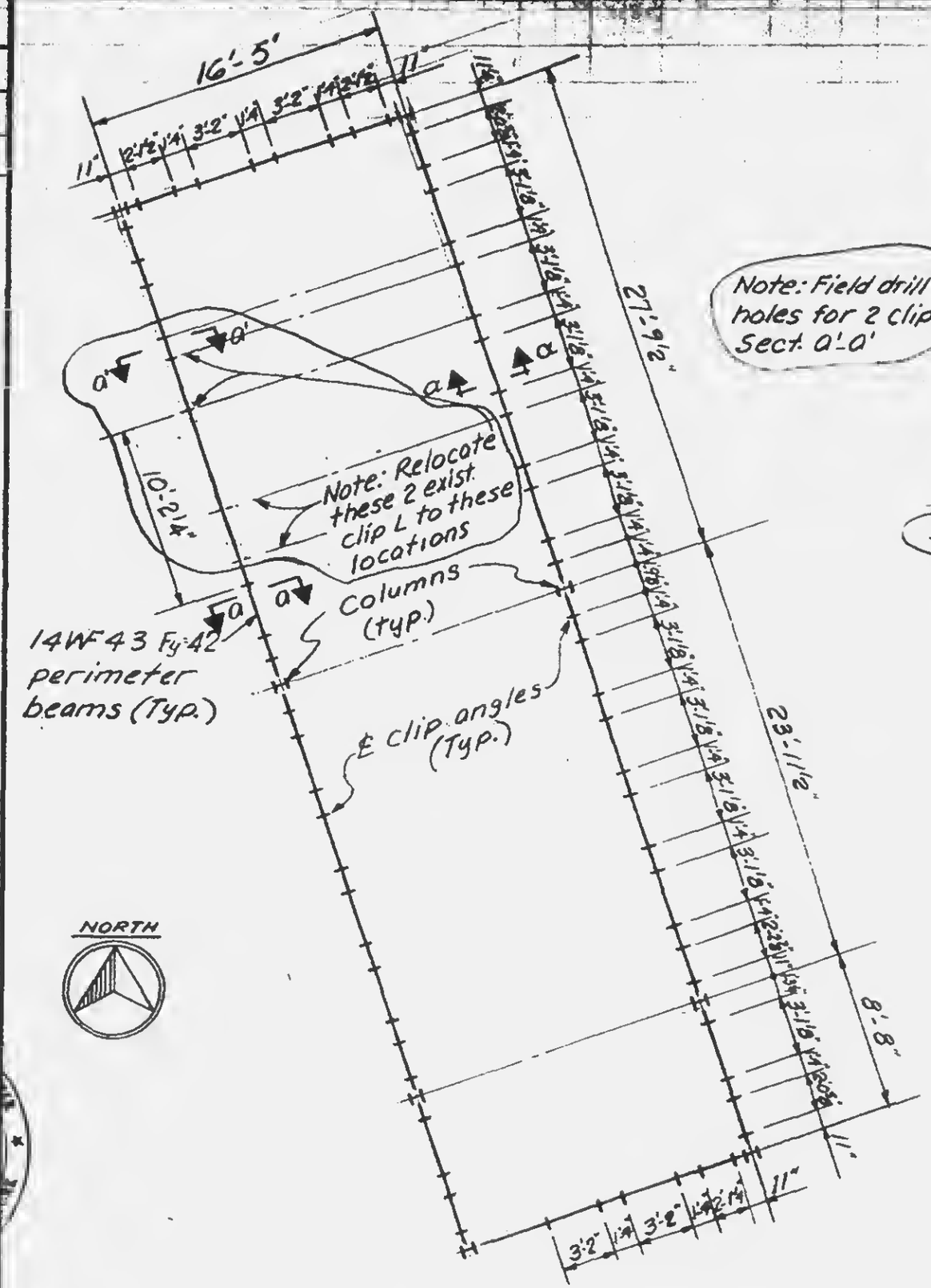
12-JK2-149

REVISIONS

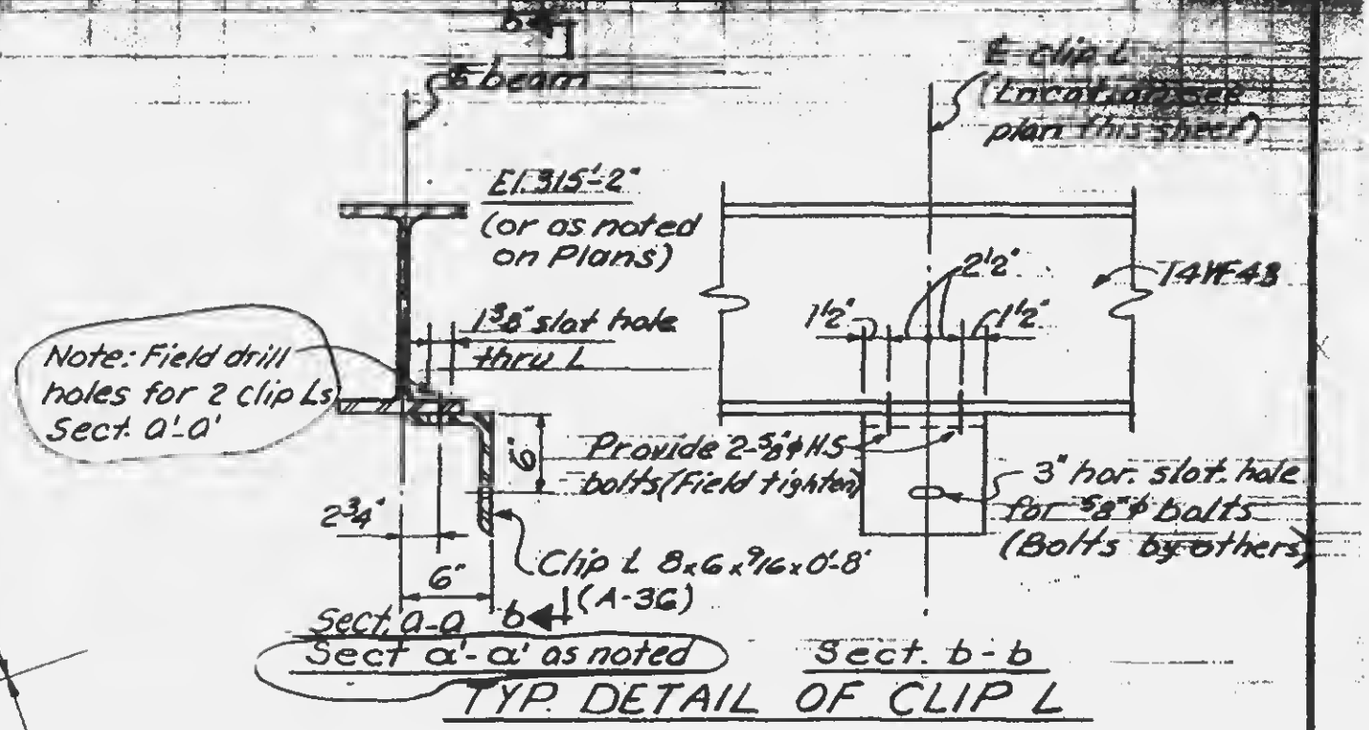
5-1-68

6-6-69

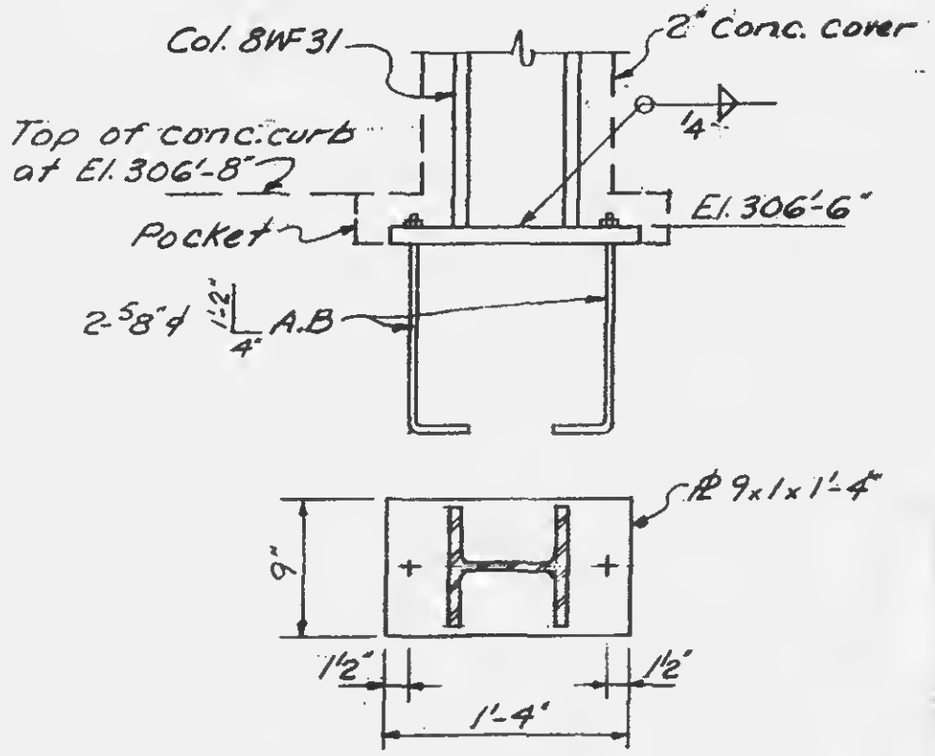
5-12-71



LOCATION OF CLIP Ls



TYP. DETAIL OF CLIP L



TYP. DETAIL OF COLUMN & BASE PL

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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DRAWN
S.C.

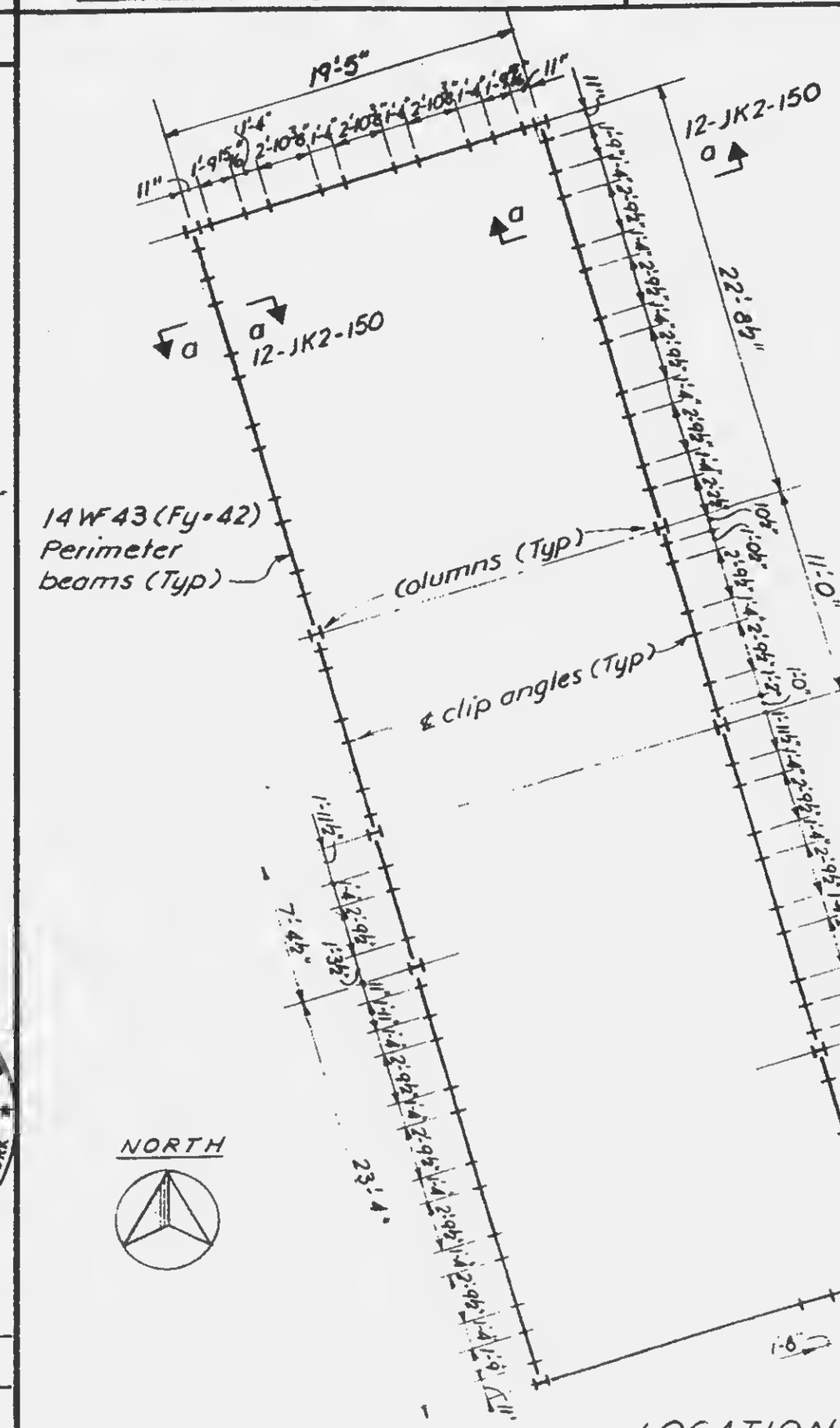
REVIEWED
E.L.

12-JK2-150

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE SOUTH PROJECTION - EXHAUST HOUSING | DATE 6-6-69

REVISIONS



LOCATION OF CLIP Ls

Notes:

1. See 12-JK2-150 for detail of clip Ls under perimeter beams and detail of columns.

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DRAWN F. Smith

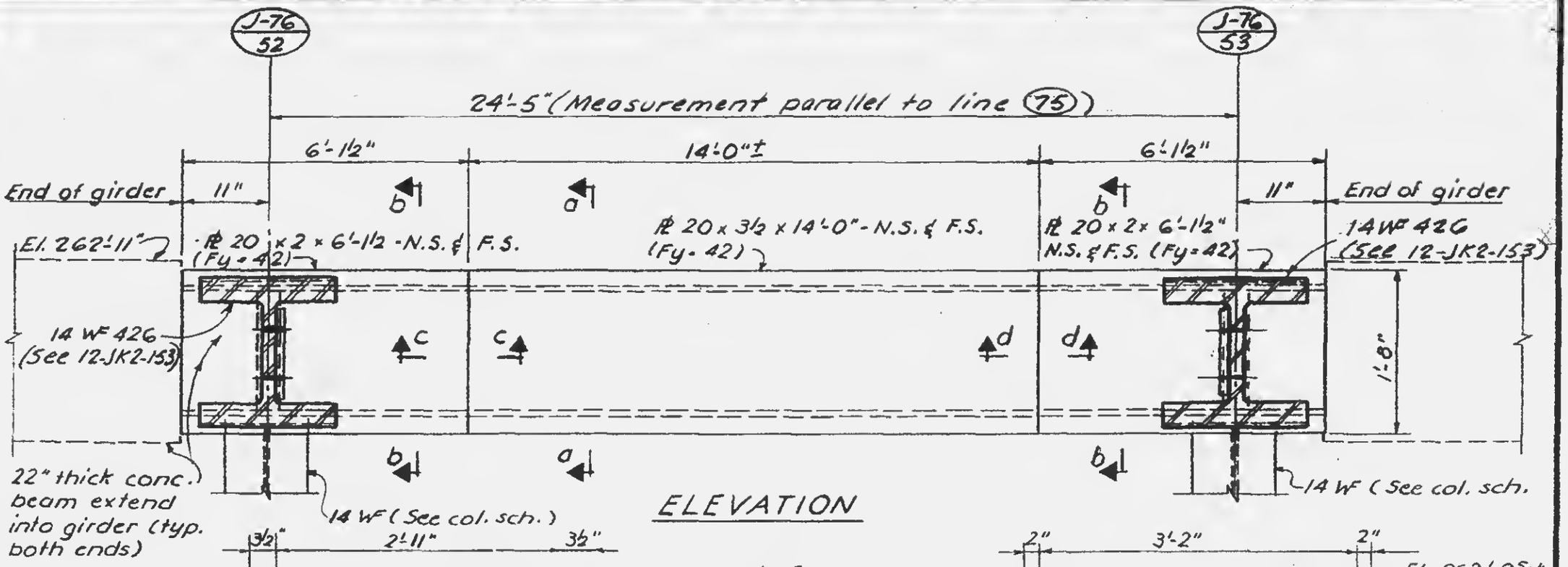
REVIEWED E.L.

12-JK2-151

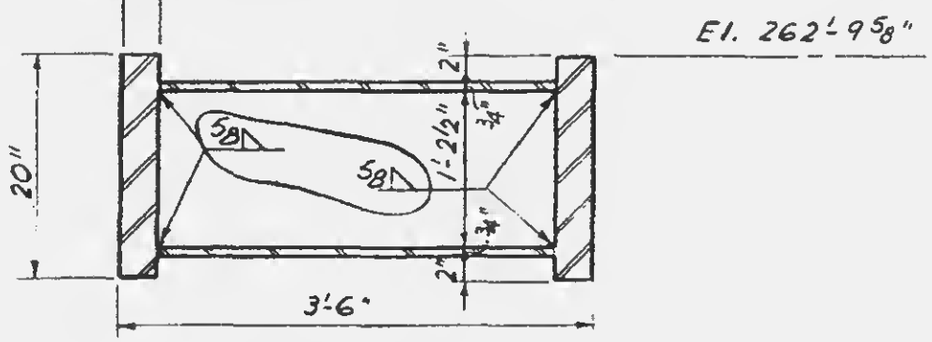
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 4-13-68

REVISIONS
1-8-69

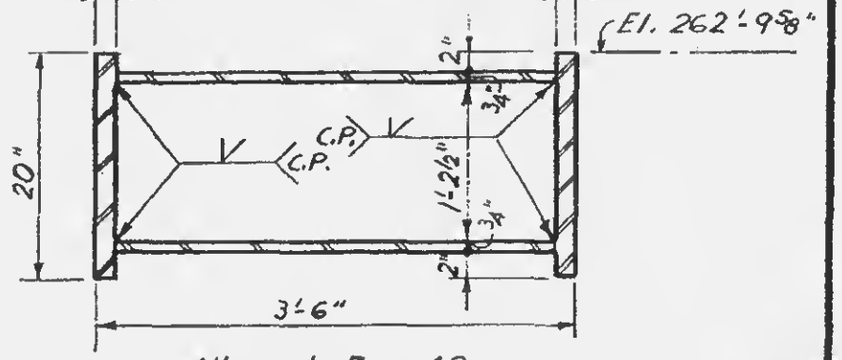


ELEVATION



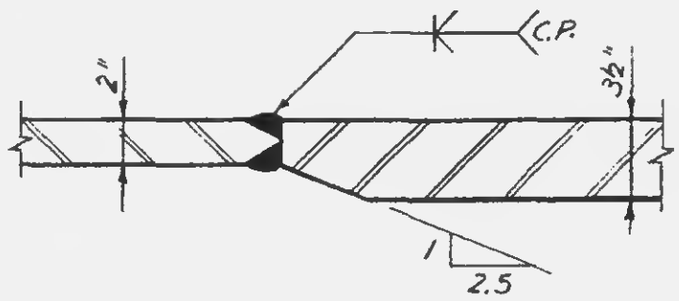
All mat. Fy = 42

Section a-a



All mat. Fy = 42

Section b-b



Section c-c (as shown)

Section d-d (opp. hand)

Notes:
1. All welds to be E 70xx.
2. All bolts to be A-325 friction type.
3. See dwg. 12-JK2-153 for connection of 14 WF 426 to girder.

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DRAWN A.F.

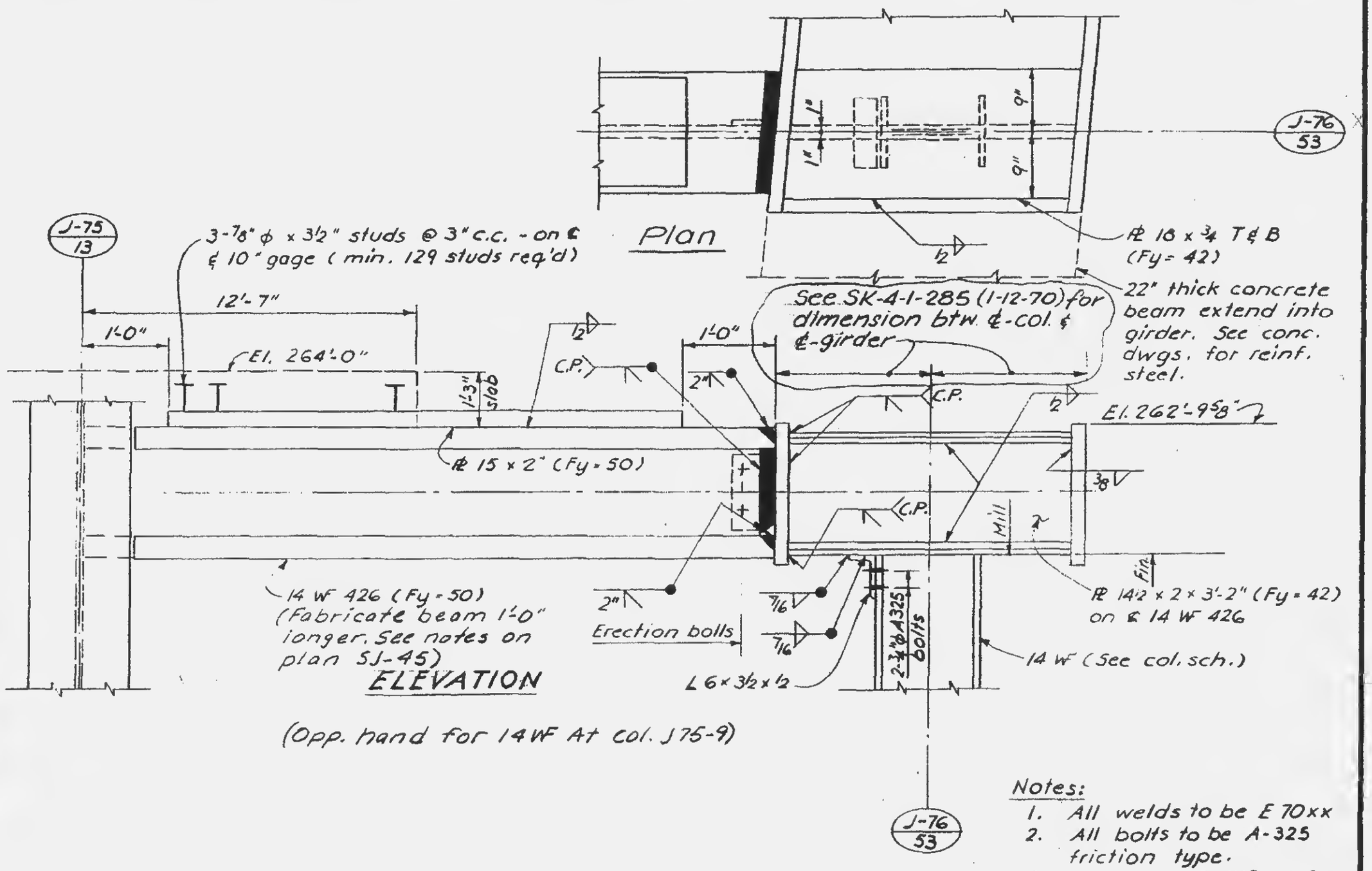
REVIEWED E.L.

12-JK2-152

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF BEAMS ADJACENT TO ESCALATOR | DATE 9-13-68

REVISIONS
5-29-69
2-11-70



ELEVATION

(Opp. hand for 14WF At col. J75-9)

Notes:
1. All welds to be E 70xx
2. All bolts to be A-325 friction type.
3. See dwg. 12-JK2-152 for horizontal girder.
4. See also, Dwg SK-4-1-285 (1-12-70) (Change No. 533.061)

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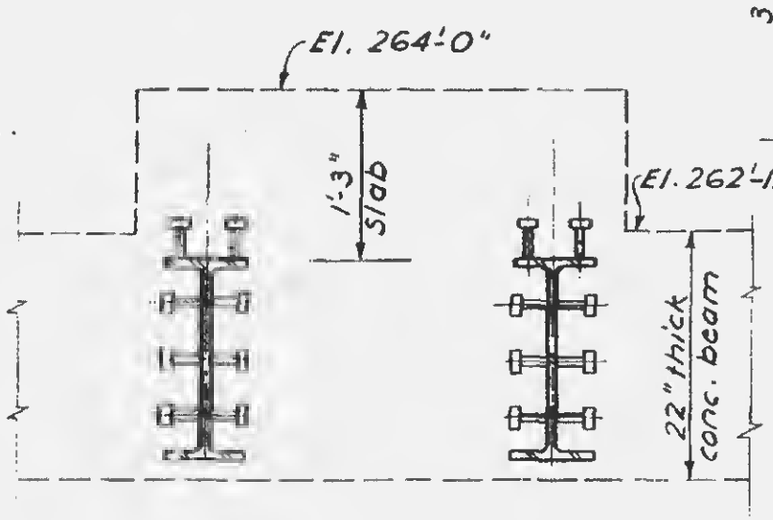
DESIGNED
DRAWN S.C.
REVIEWED E.L.

12-JK2-153

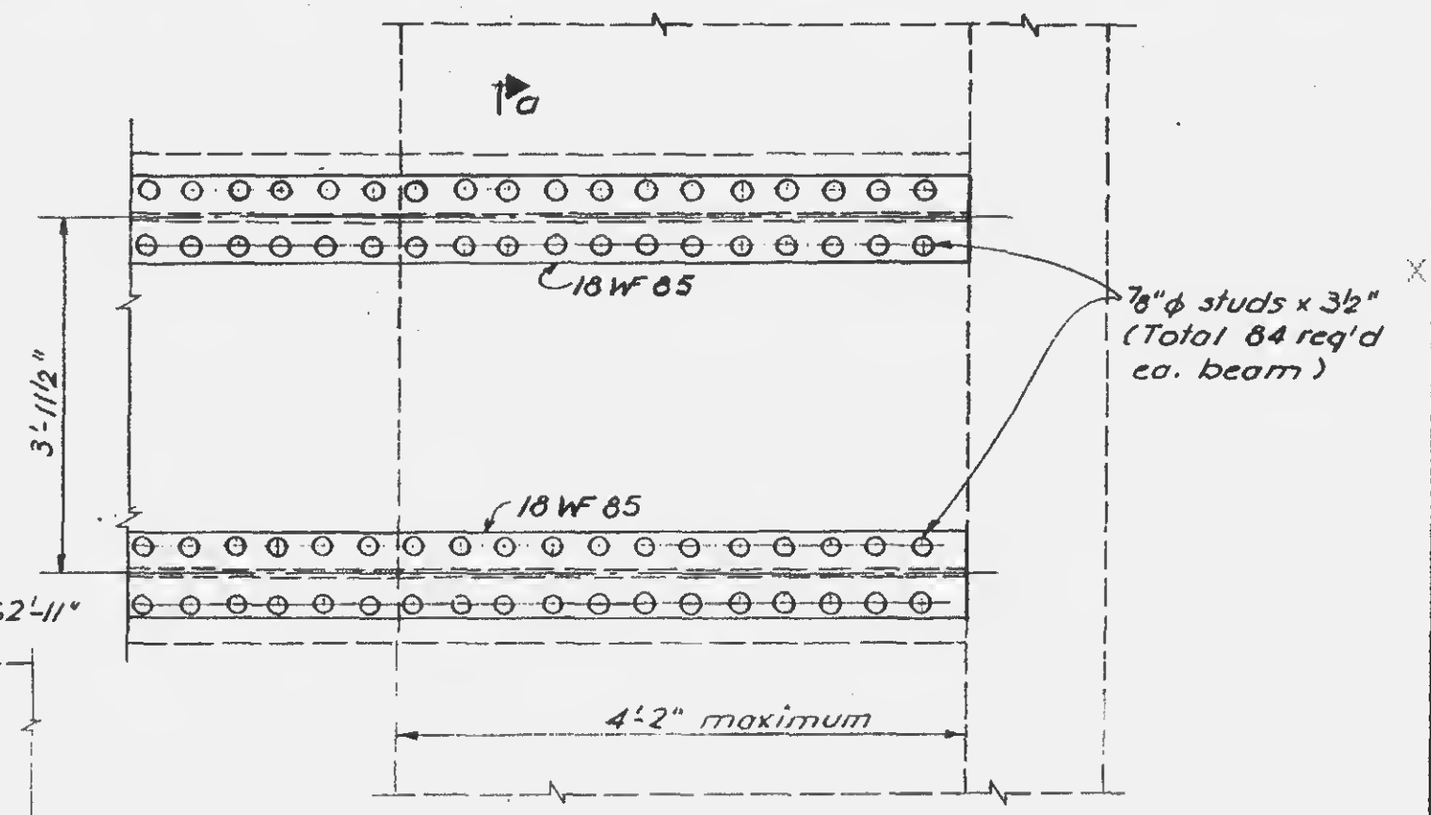
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF BEAMS ADJACENT TO STAIRWAY | DATE: 9-13-68

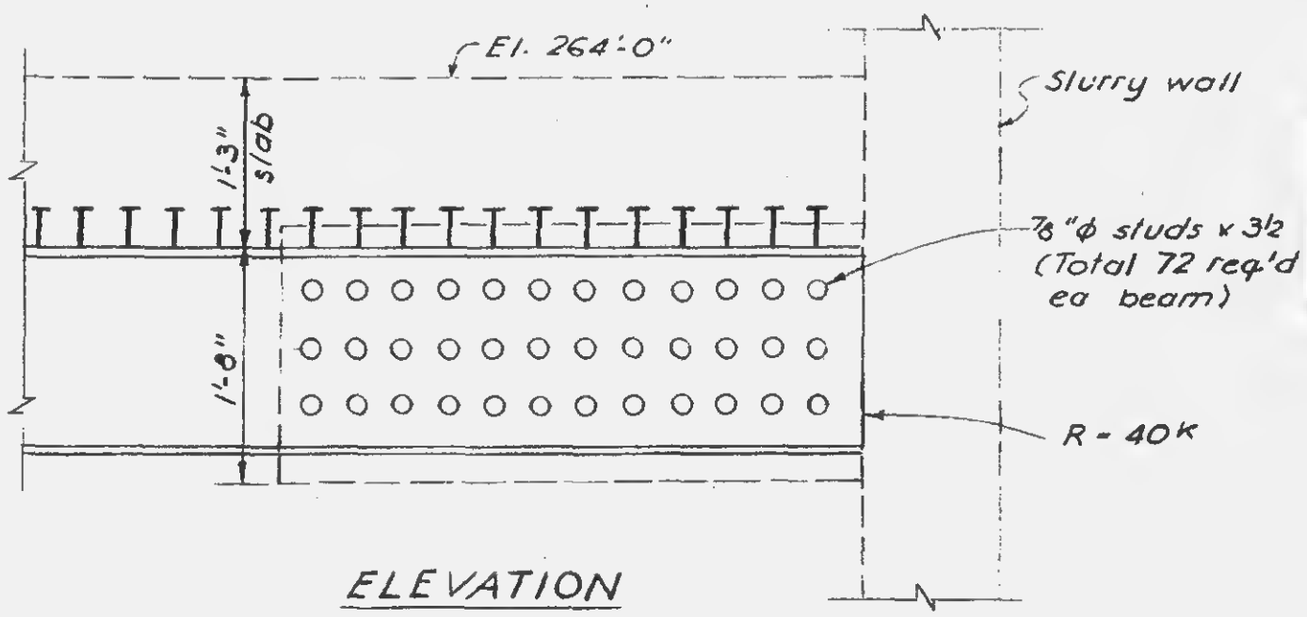
REVISIONS



Section a-a



a — Plan



ELEVATION

Notes:
1. Fabricate beams one foot longer. See notes on SJ-45.

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DESIGNED

DRAWN

REVIEWED

12-JK2-154

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON

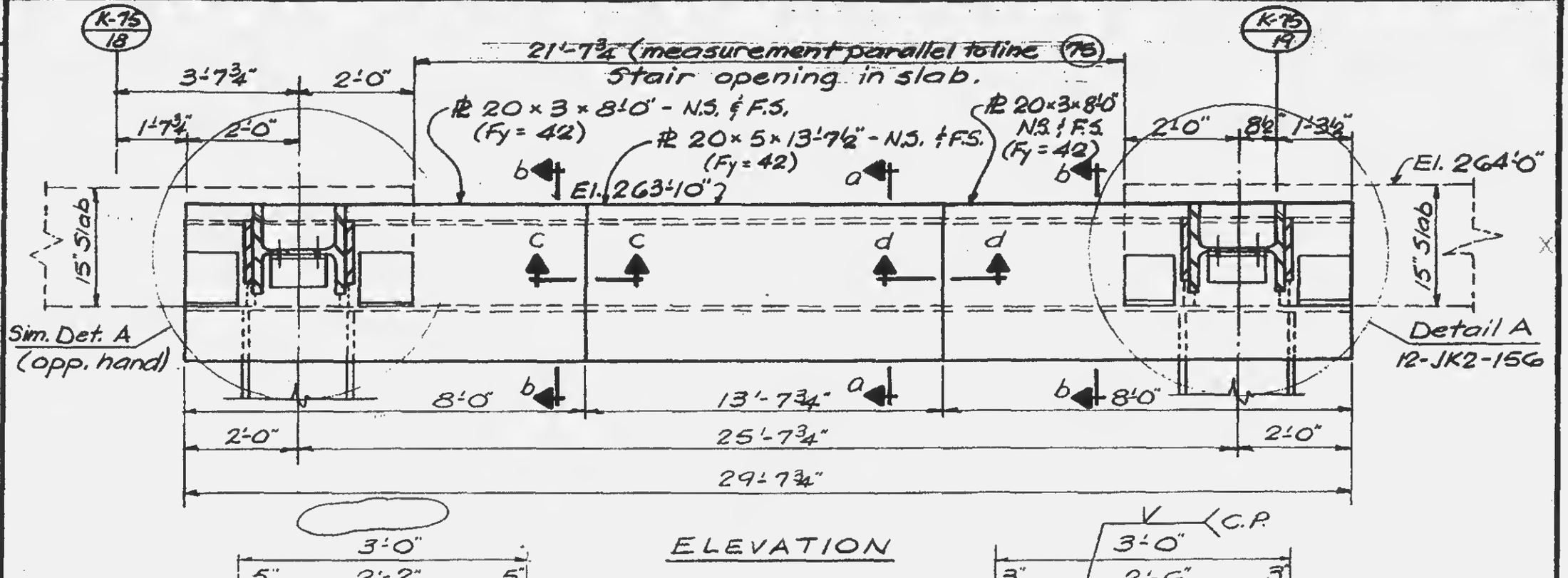
PROJECT: THE WORLD TRADE CENTER

TITLE: DETAIL OF PLATE GIRDER

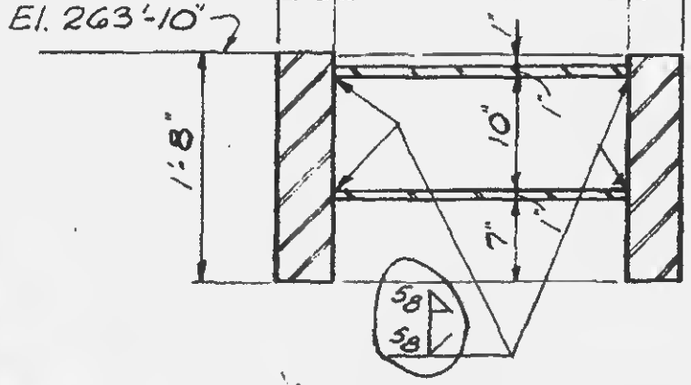
DATE: 7-15-68

REVISIONS

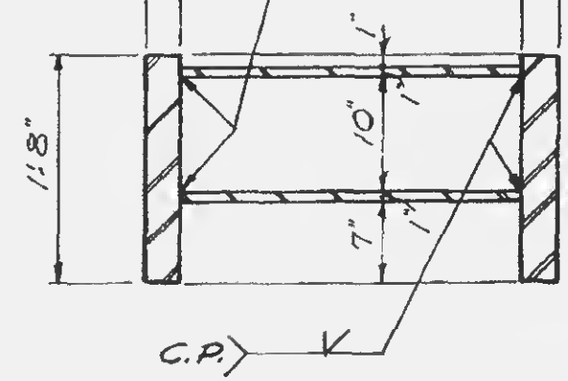
1-8-69



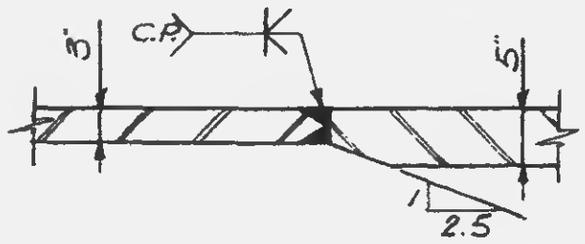
ELEVATION



SECTION a-a
(All material, Fy = 42)



SECTION b-b
(All materials, Fy = 42)



SECTION c-c (As shown)

SECTION d-d (Opp. hand)

Notes :
1. All welds to be E70XX
2. All bolts to be A325 friction type.

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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

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DRAWN
A.F.

REVIEWED
E.L.

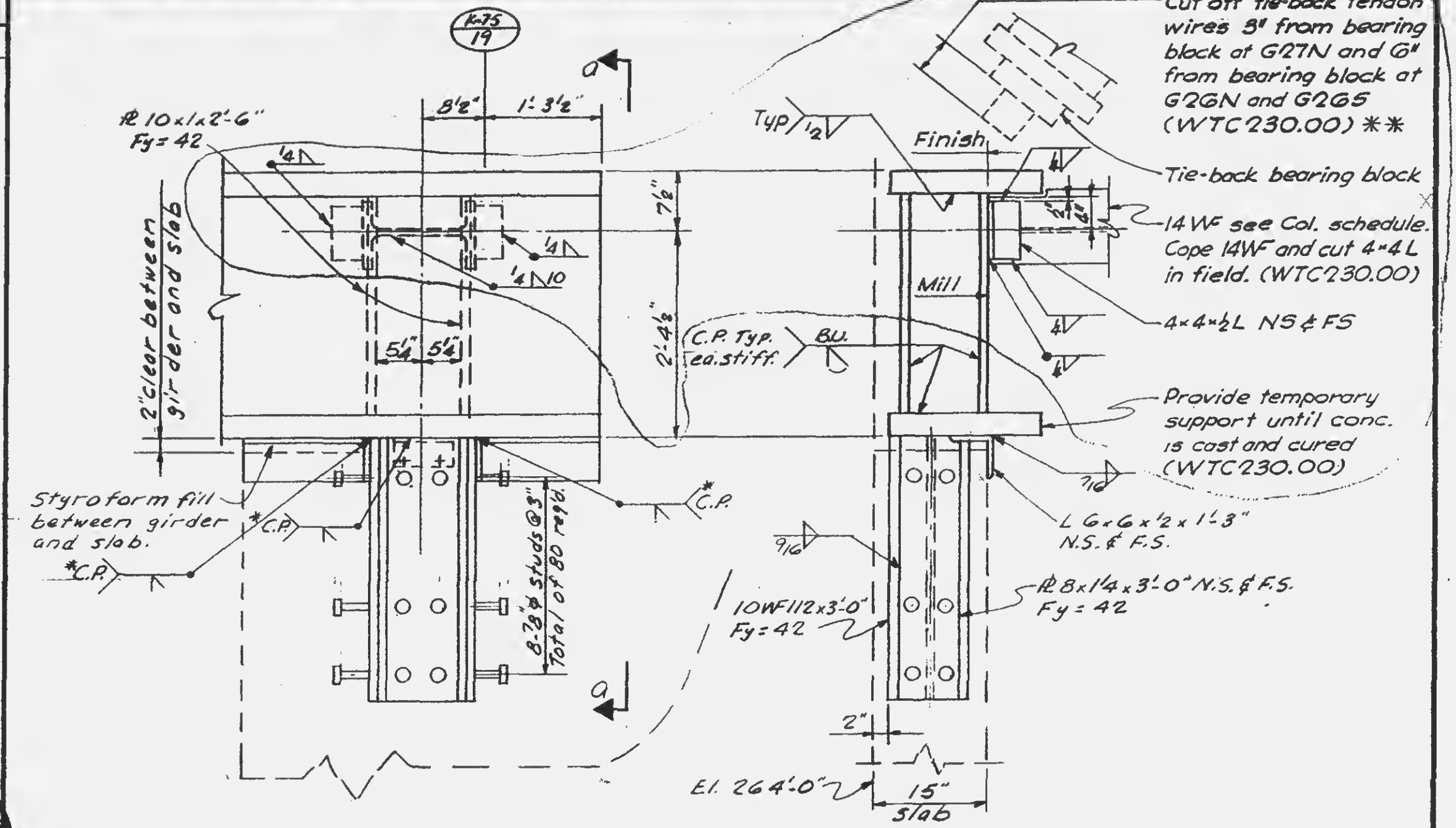
12-JK2-155

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 9-18-68

REVISIONS

11-5-69 R



PLAN

Section a-a

*- Shop weld at contractor's option.

**- Cutting procedure shall avoid excess heat in tendon wires.

Note:
1. All welds to be E70 xx.

DETAIL A

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DESIGNED

DRAWN S.C.

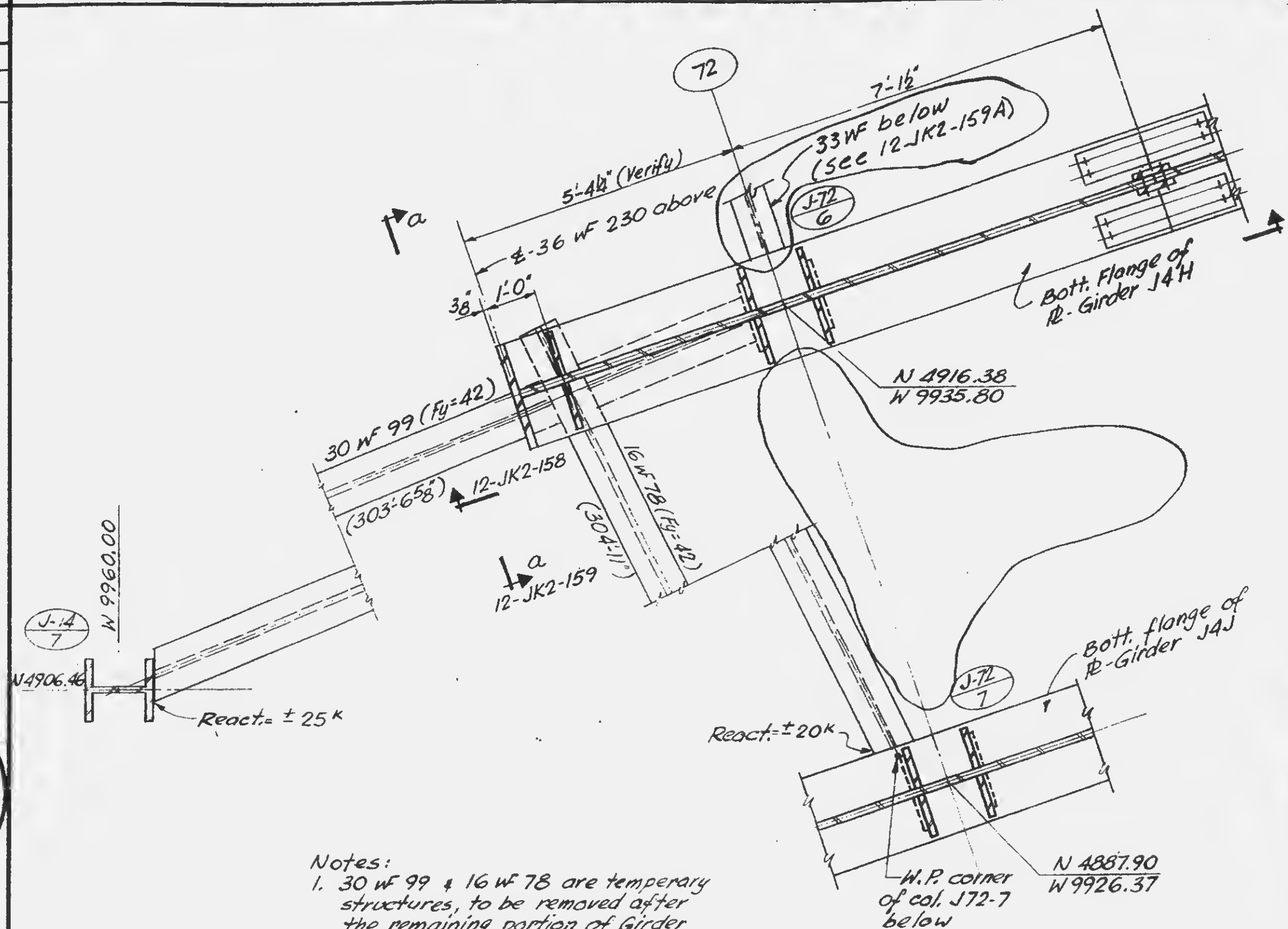
REVIEWED E.L.

12-JK2-156

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE TEMPORARY STRUCTURE | DATE 10-15-68

REVISIONS
11-11-68
12-3-68



Notes:
1. 30 WF 99 & 16 WF 78 are temperary structures, to be removed after the remaining portion of Girder J4H are properly installed.

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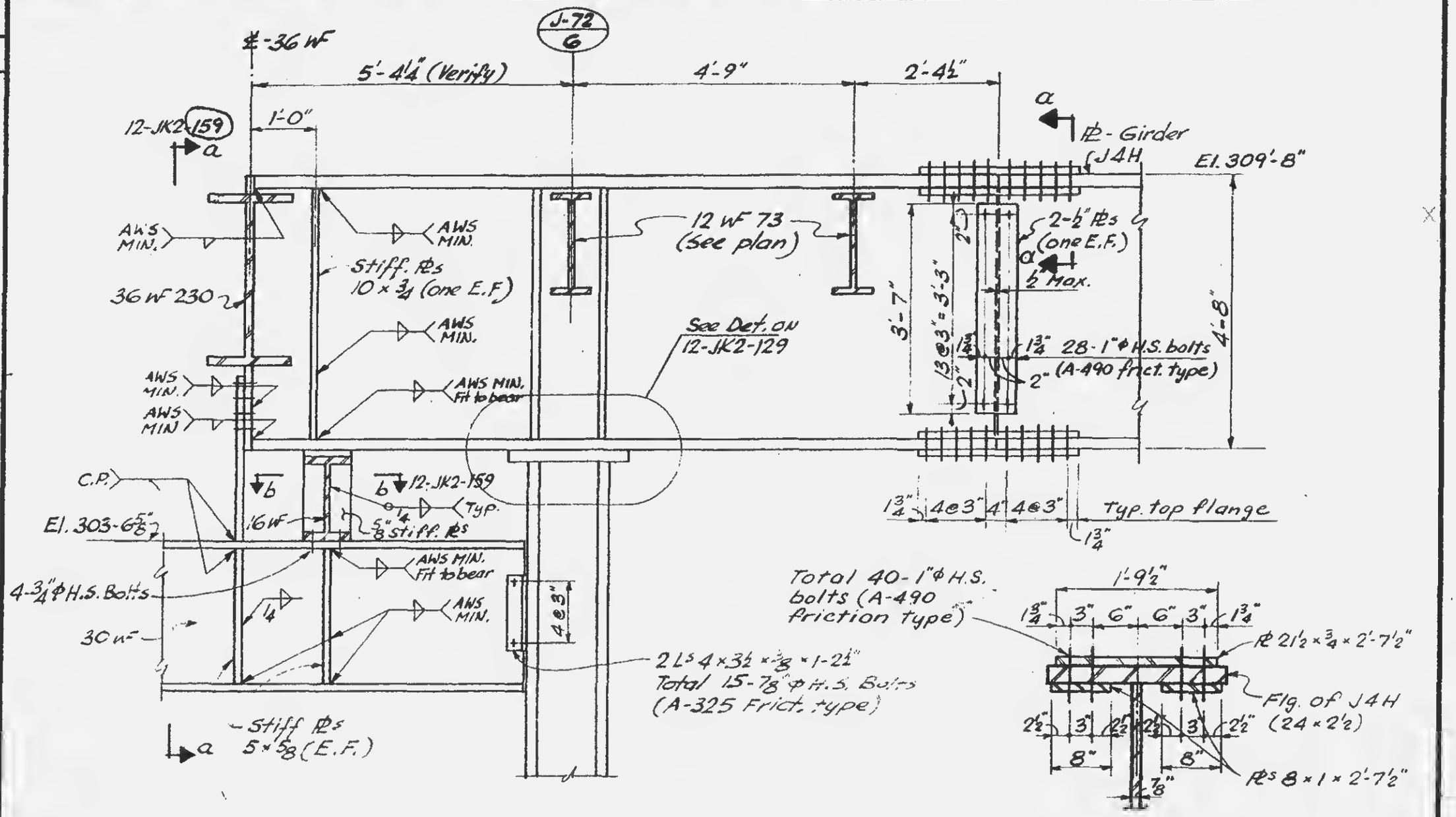
DESIGNED
DRAWN
REVIEWED

12-JK2-157

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: TEMPORARY STRUCTURE | DATE: 10-15-68

REVISIONS
1-8-69



Section a-a
(typ. bottom flange)

Notes:
1. All ℞s to have Fy=42 KSI except as noted.
2. All welds to be E70XX.

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LESLIE E. ROBERTSON
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UNIVERSITY OF THE STATE OF NEW YORK

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DRAWN
A.F.

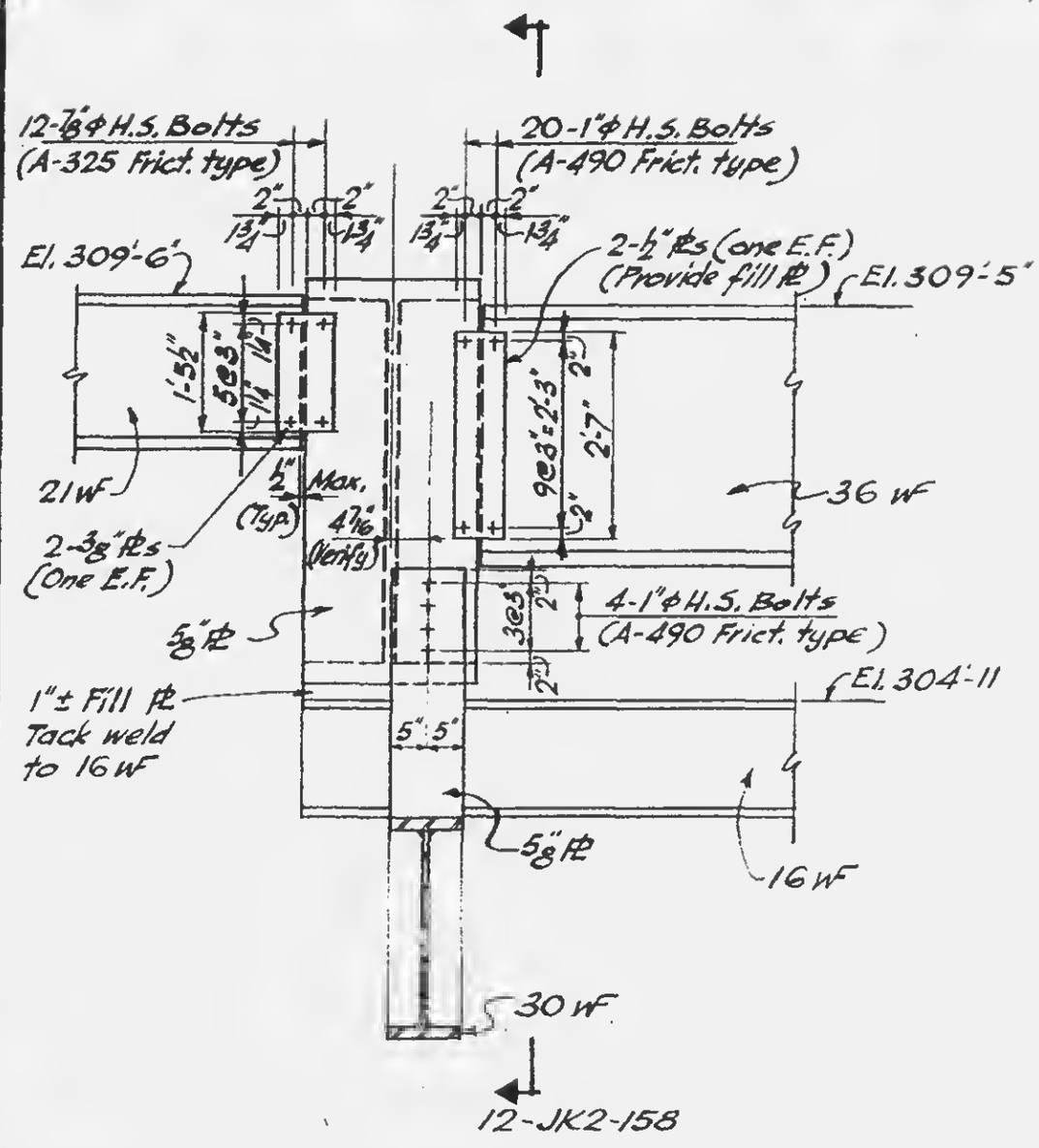
REVIEWED
E.L.

12-JK2-158

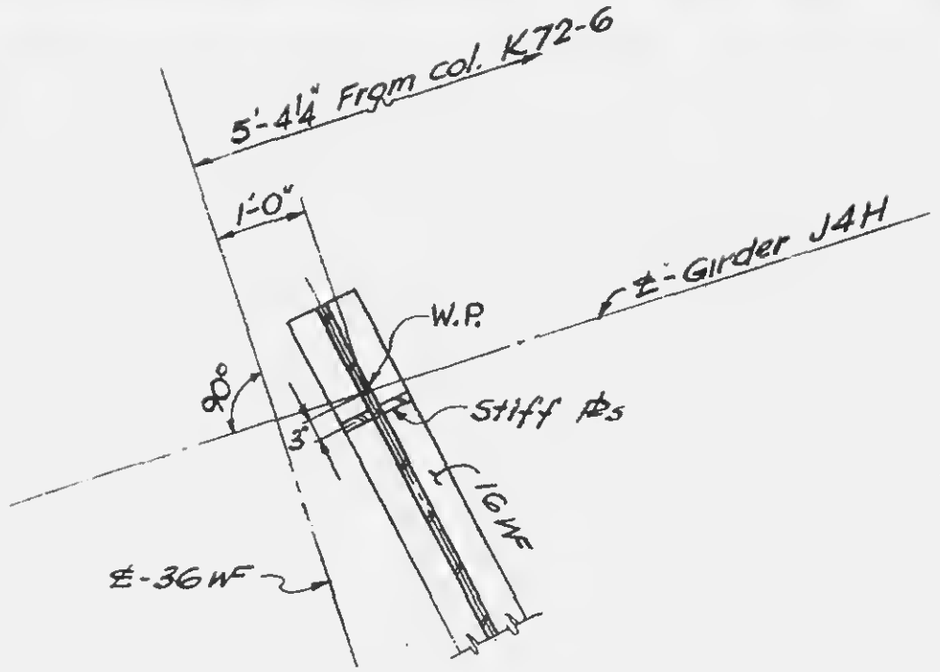
SKILLING HELLE CHRISTIANSEN ROBERTSON

PROJECT THE WORLD TRADE CENTER | TITLE TEMPORARY STRUCTURE | DATE 10-12-68

REVISIONS



Section a-a



Section b-b

Notes:
1. All ϕs to have Fy=42 KSI Except as noted
2. All welds to be E70XX

DESIGNED

DRAWN

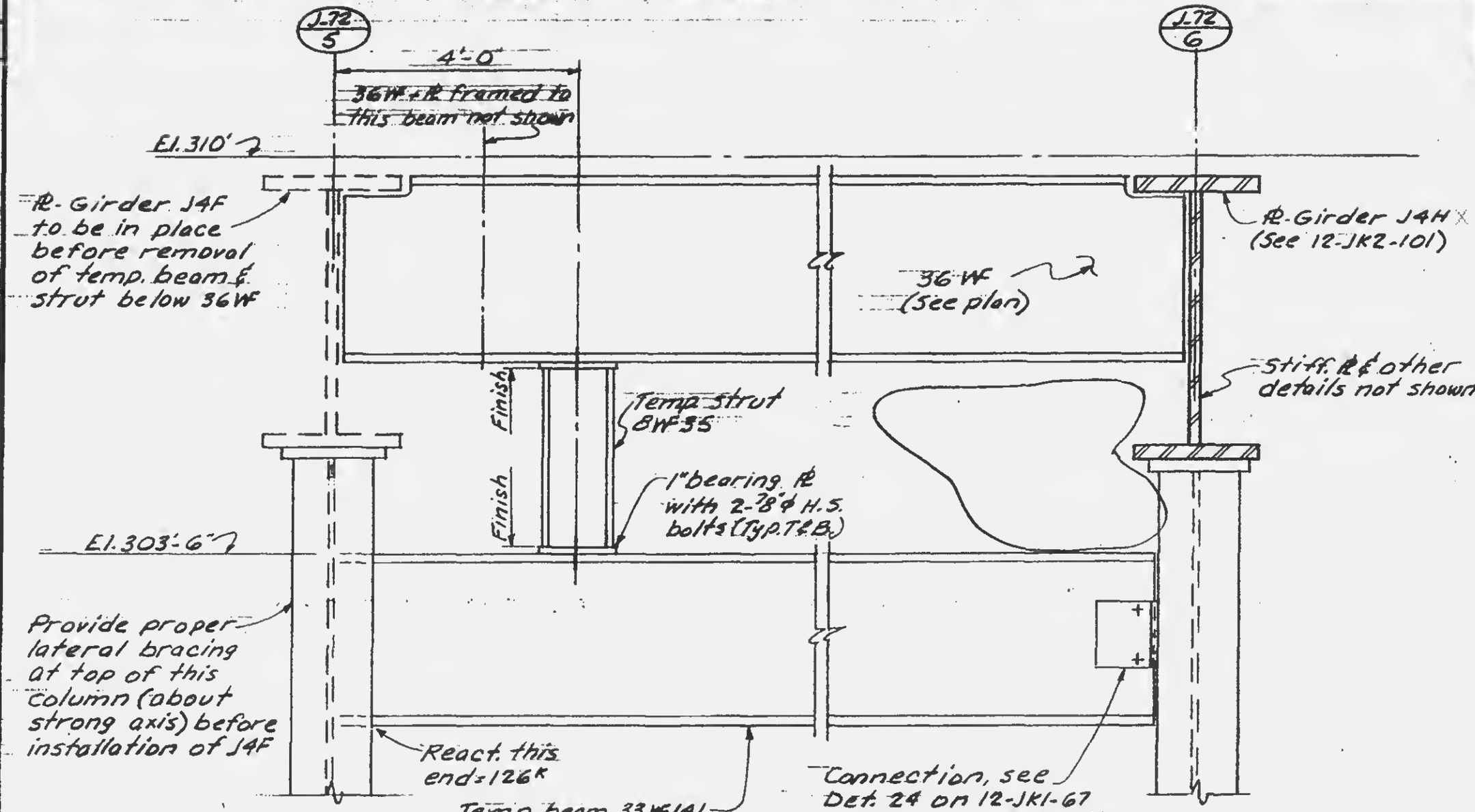
REVIEWED

12-JK2-159

11-11-68

REVISIONS

12-3-68



Notes:

1. All bolts to be A-325 friction type.
2. Temp. beam shown is designed for load from El. 310 only. Floor at El. 332 should not be built until 36WF is properly connected to ℄ Girder J4F.

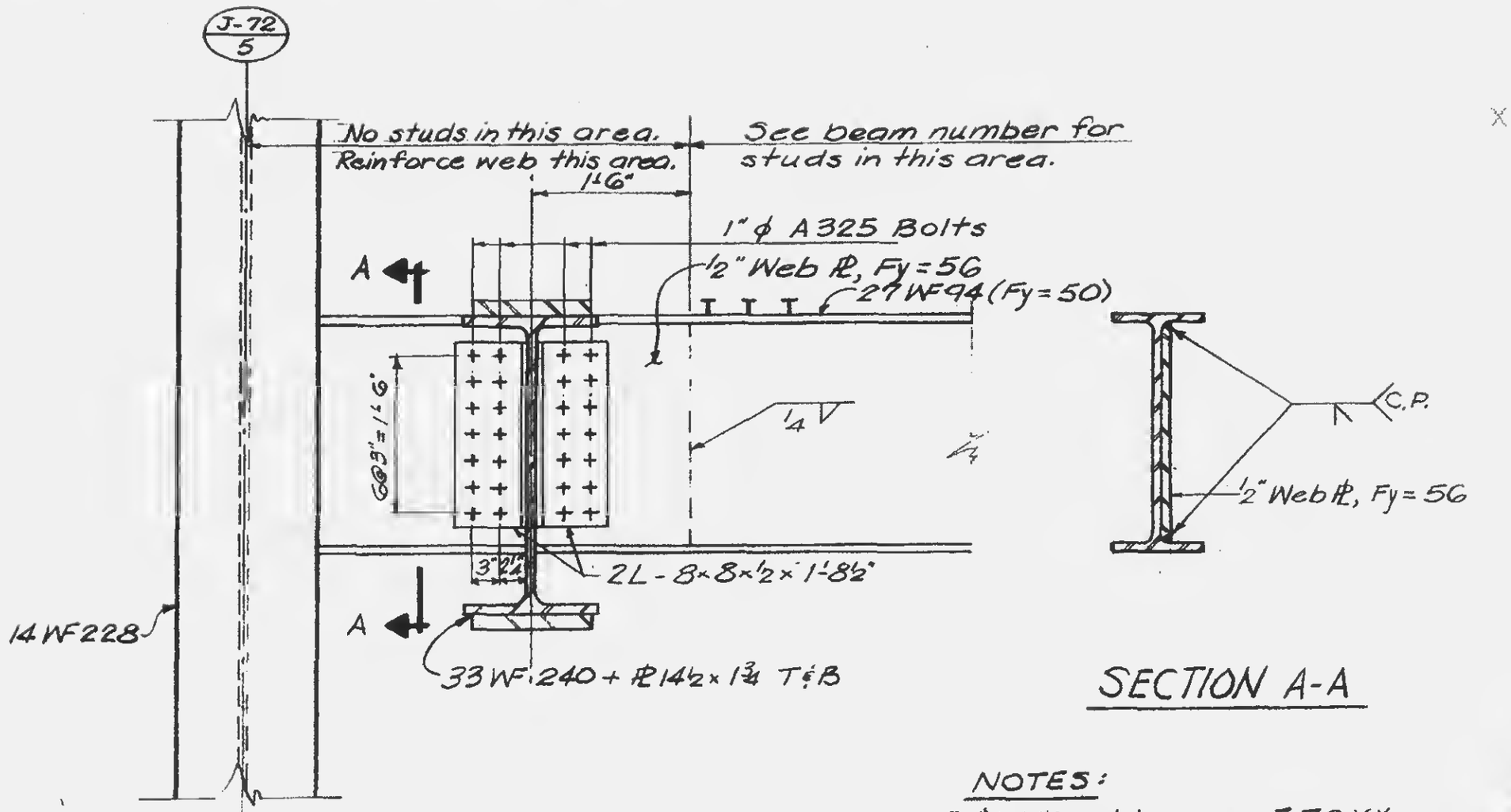
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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK
LICENSED PROFESSIONAL ENGINEER

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DRAWN

REVIEWED

12-JK2-159A



SECTION A-A

NOTES:
1) All welds are E70XX.
2) All bolts are A325 High Strength (friction type).

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DRAWN

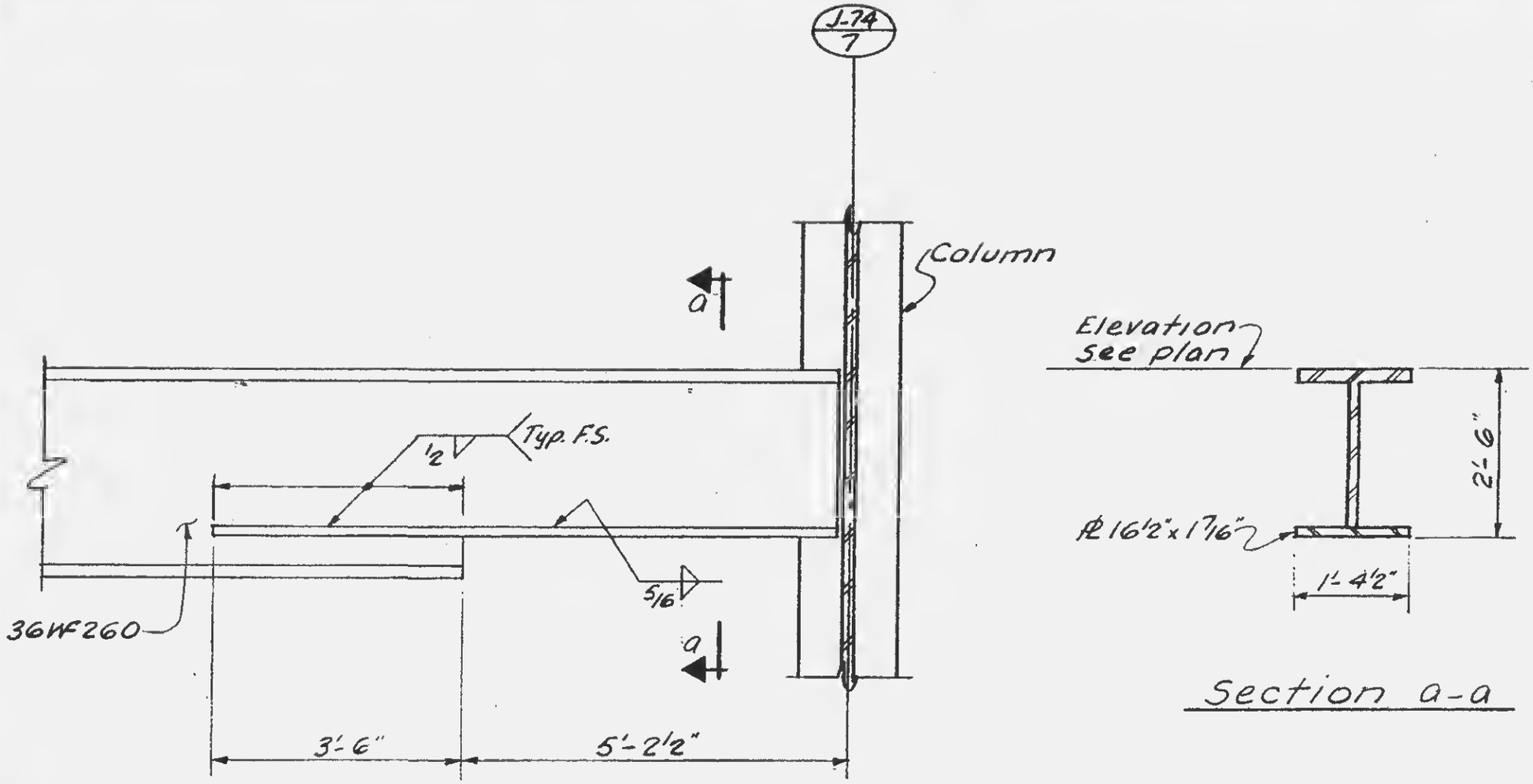
REVIEWED

12-JK2-160

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM DETAIL | DATE: 12-3-68

REVISIONS



ELEVATION

Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN

REVIEWED

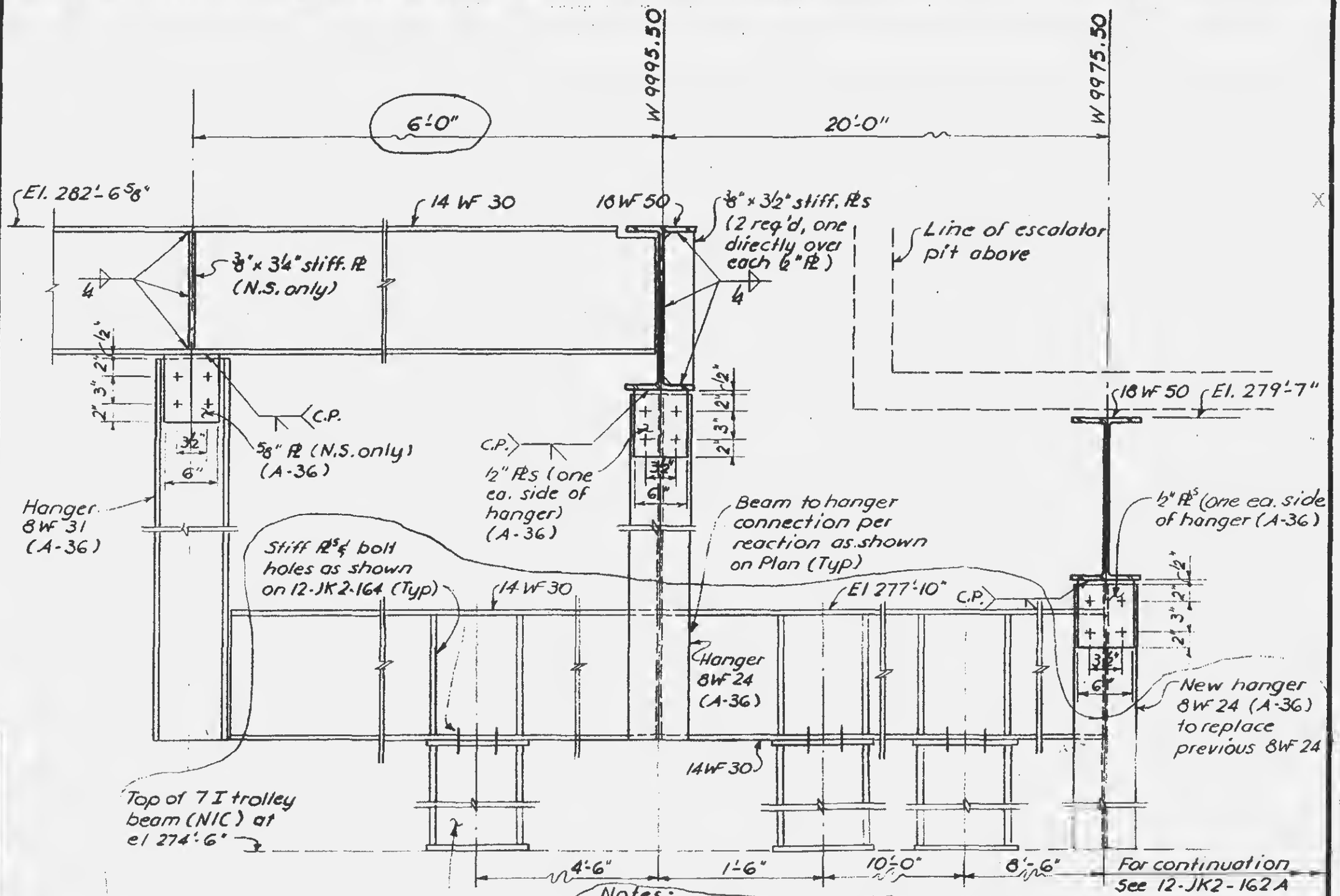
12-JK2-161

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM DETAILS | DATE: 11-27-68

REVISIONS

6-19-69



Notes:

1. All bolts to be 3/4" ϕ H.S. friction type.
2. All welds to be E70XX.
3. See 12-JK2-164 for typical detail of supports for future trolley beams.
4. Allow 1/8" erection clearance between Pl & hangers. Provide shims if necessary to insure surface contact for friction type H.S. bolts.

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DESIGNED

DRAWN: F. Smith

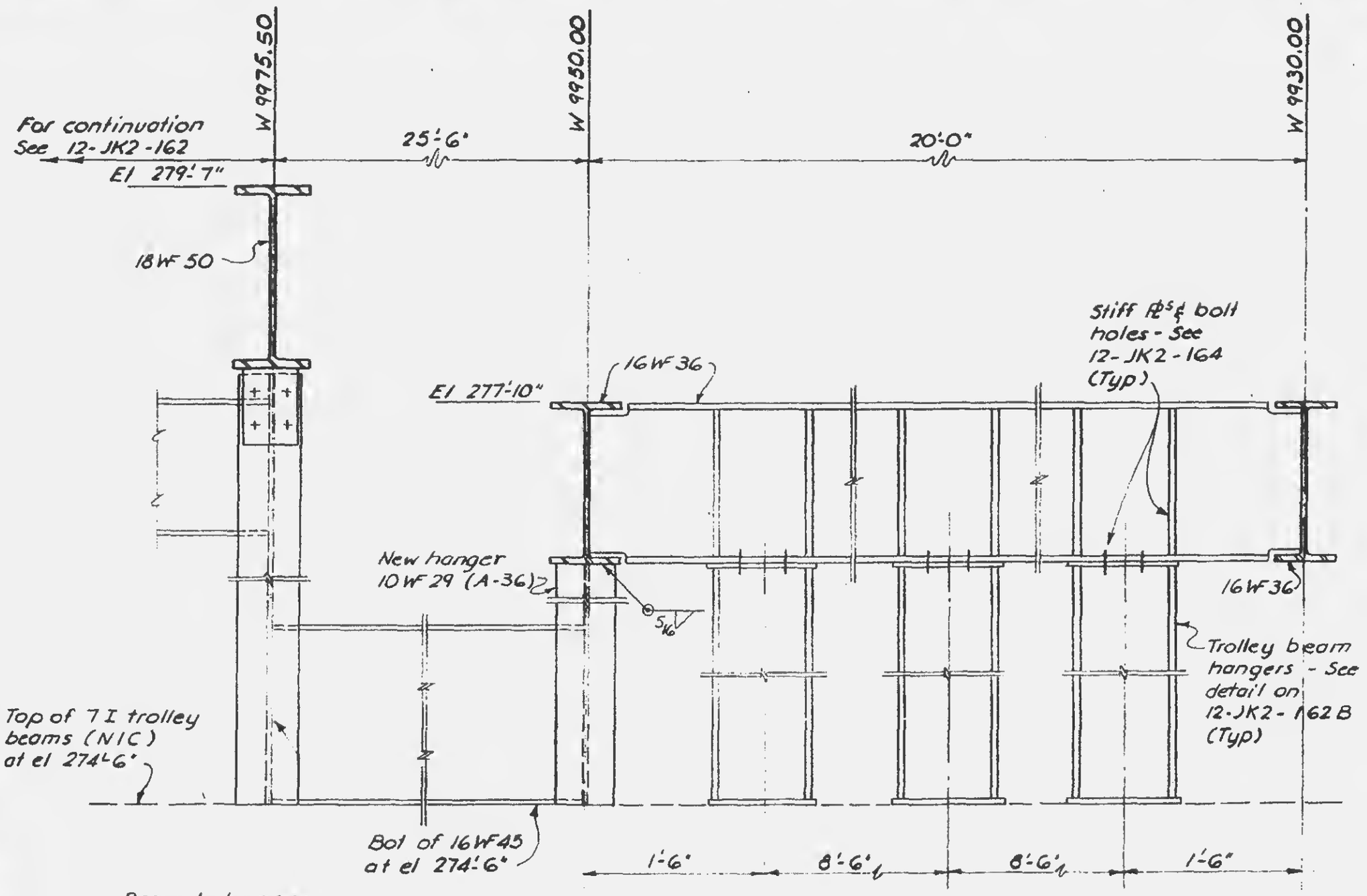
REVIEWED: E.L.

12-JK2-162

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT	TITLE	DATE
THE WORLD TRADE CENTER	BEAM DETAILS	6-19-69

REVISIONS



See Notes on 12-JK2-162

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DRAWN F. Smith

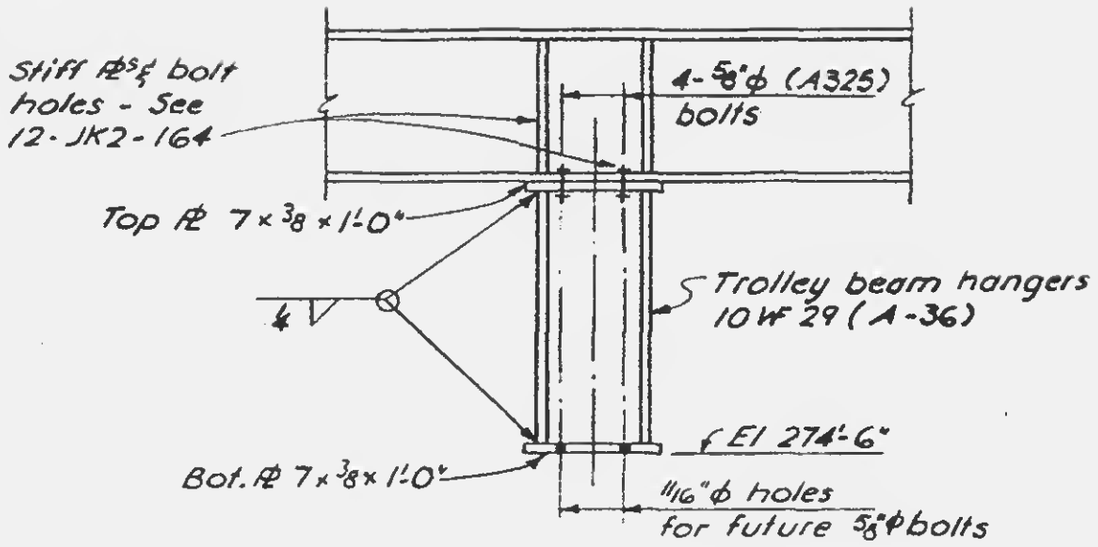
REVIEWED E.L.

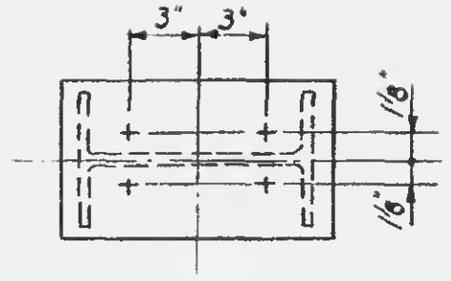
12-JK2-162A

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE TROLLEY BEAM HANGER DETAILS | DATE 6-19-69

REVISIONS





Plan of Bot. Plate

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UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN F. Smith

REVIEWED E.L.

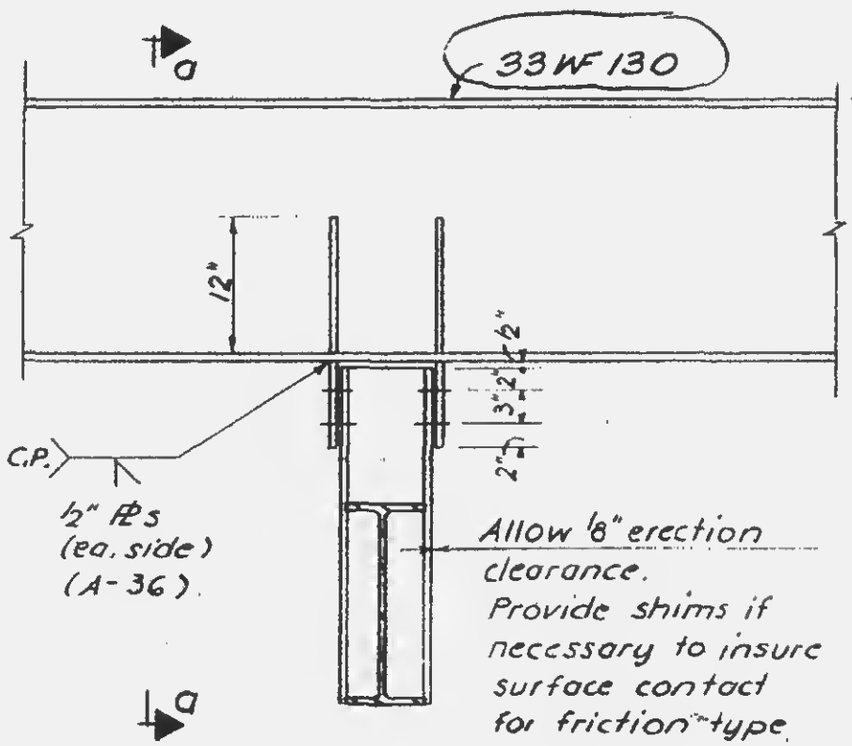
12-JK2-162B

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

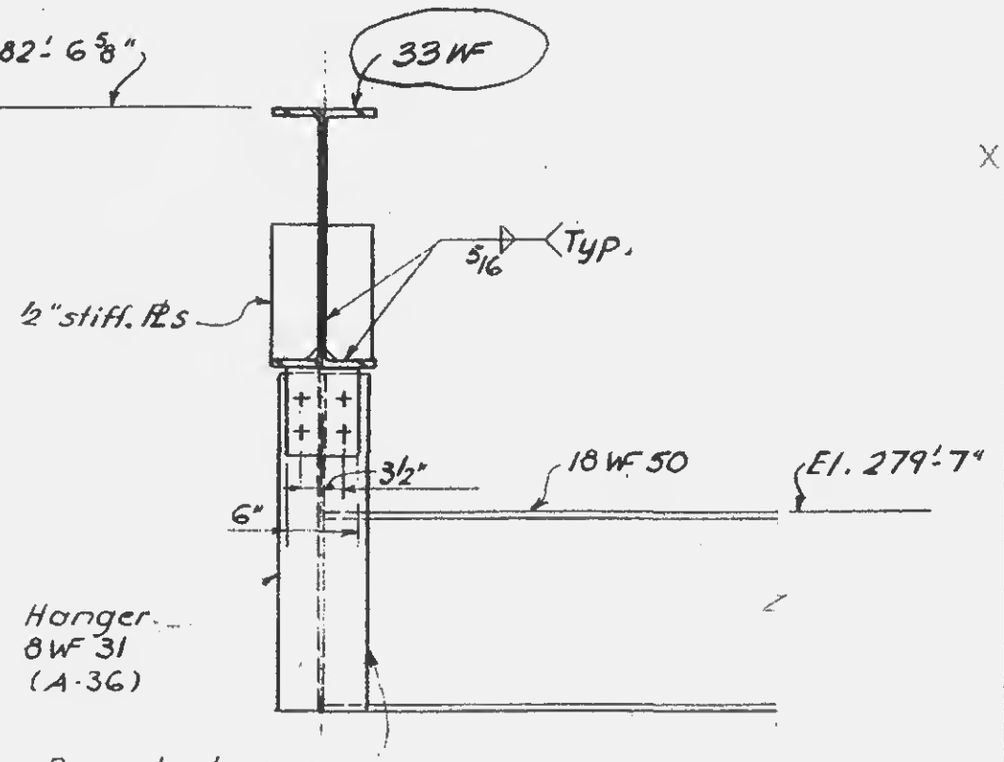
PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM DETAILS | DATE: 11-27-68

REVISIONS

1-20-69



ELEVATION



Section a-a

Notes:
1. All bolts to be ¾" ϕ H.S. friction type.
2. All welds to be E 70xx.

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN S.C.

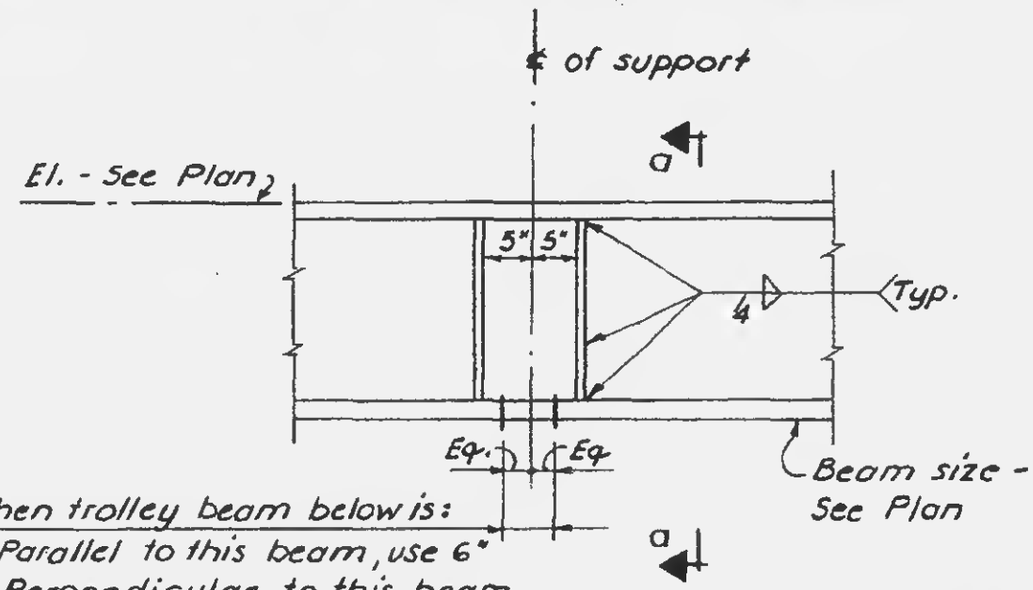
REVIEWED E.L.

12-JK2-163

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: BEAM DETAILS | DATE: 11-27-68

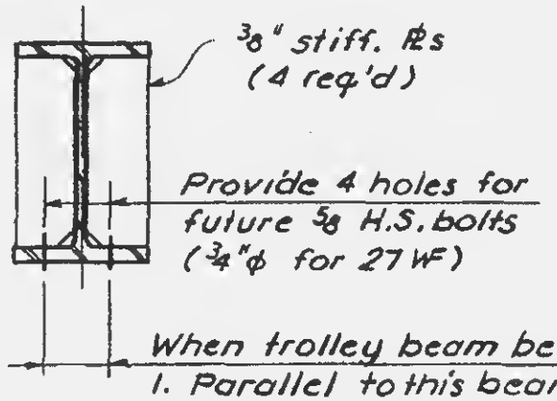
REVISIONS



When trolley beam below is:
1. Parallel to this beam, use 6"
2. Perpendicular to this beam use g-value of beam below.

(Where other beam frame into this one, see detail below.)

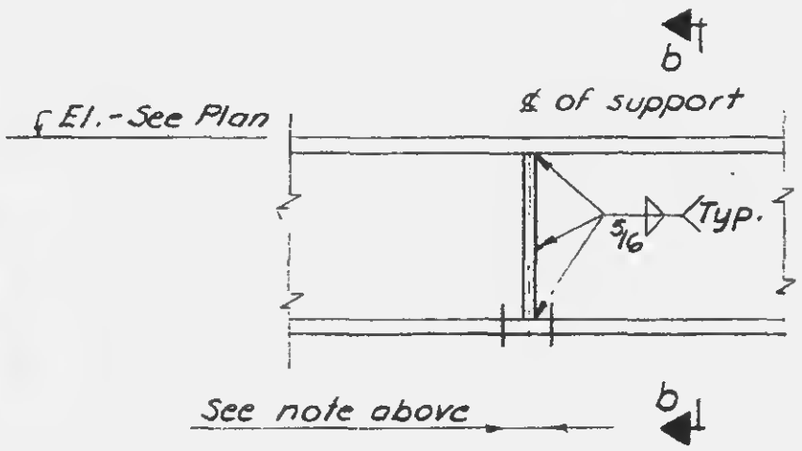
Elevation



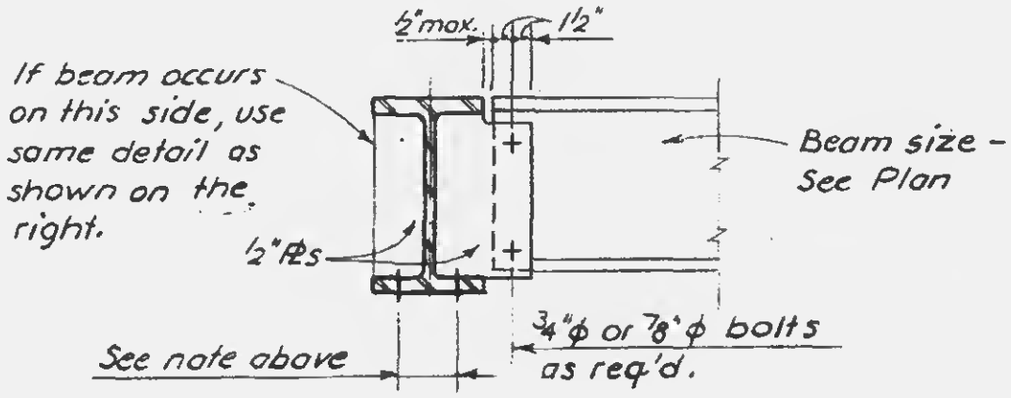
When trolley beam below is:
1. Parallel to this beam, use g-value of beam below.
2. Perpendicular to this beam, use g-value of this beam.

Section a-a

TYPICAL DETAIL OF SUPPORT FOR FUTURE TROLLEY BEAMS



Elevation



Section b-b

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DESIGNED

DRAWN

REVIEWED

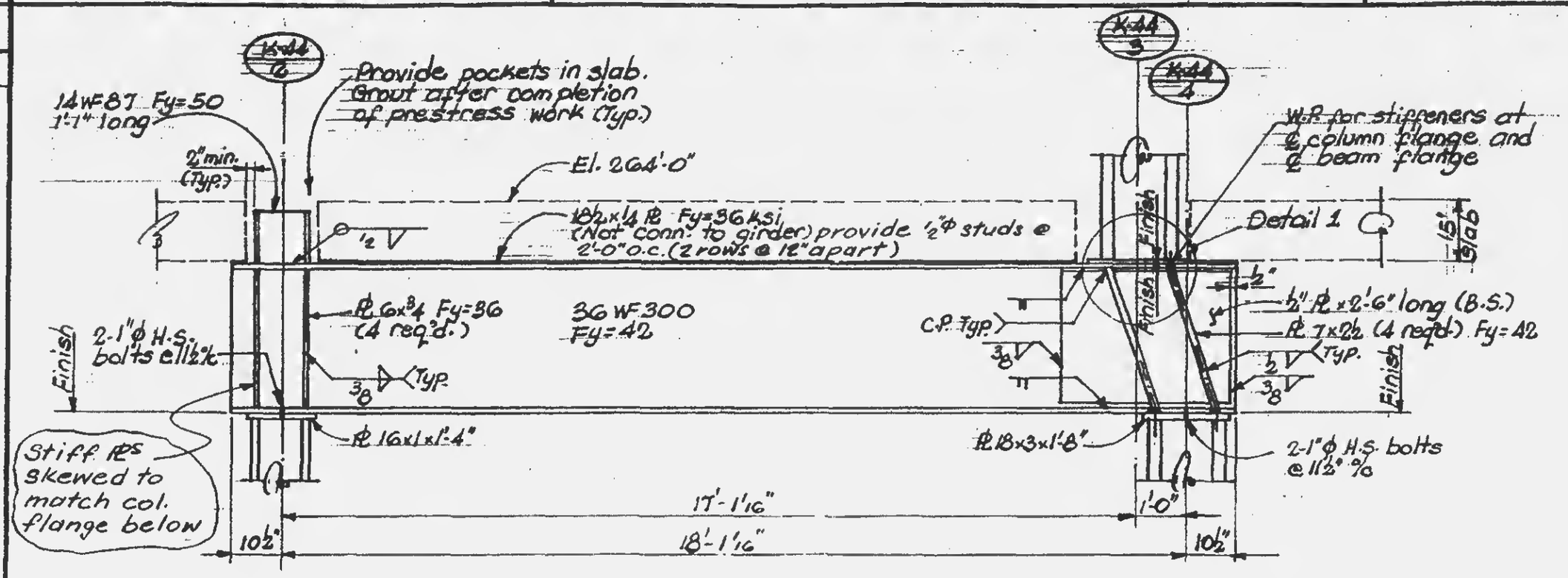
12-JK2-164

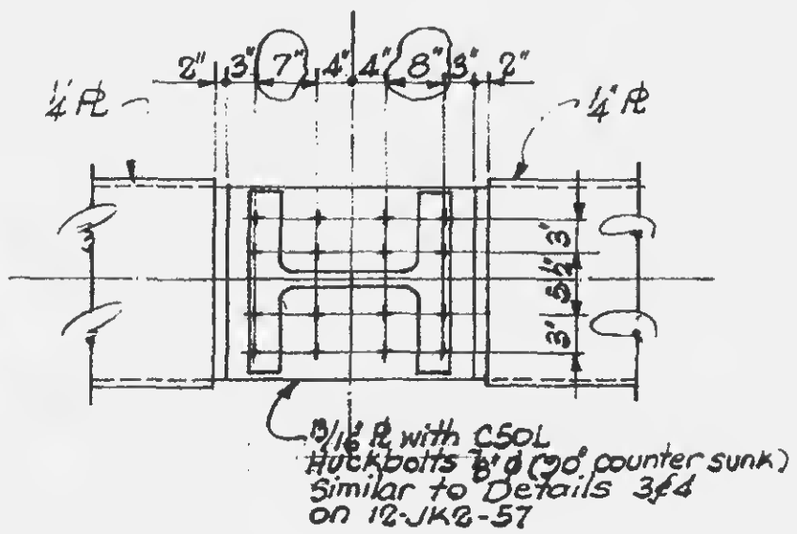
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 12-17-68

REVISIONS

2-19-69





Detail 1

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No. 34960
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN S.C.

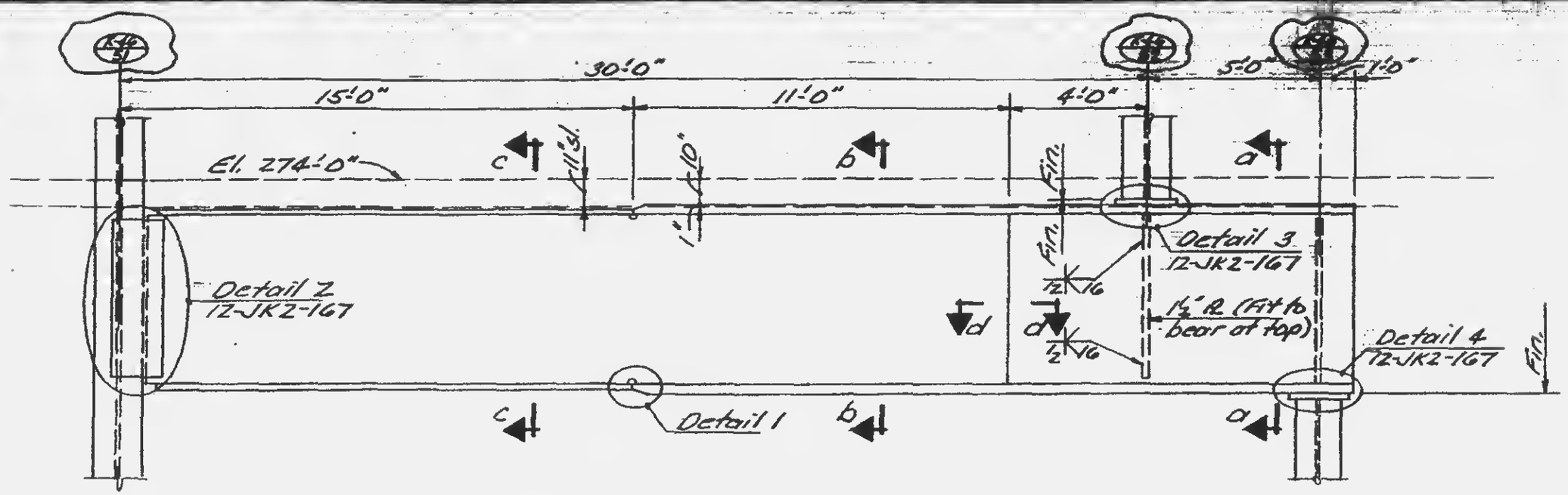
REVIEWED E.L.

12-JK2-165

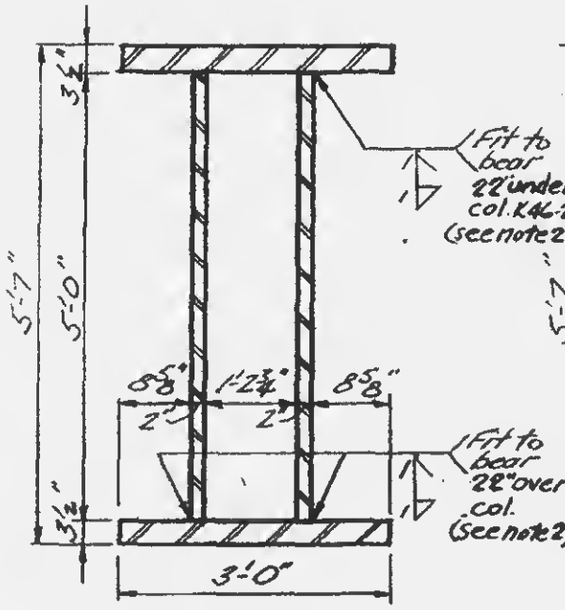
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON

PROJECT THE WORLD TRADE CENTER — DETAIL OF PLATE GIRDER

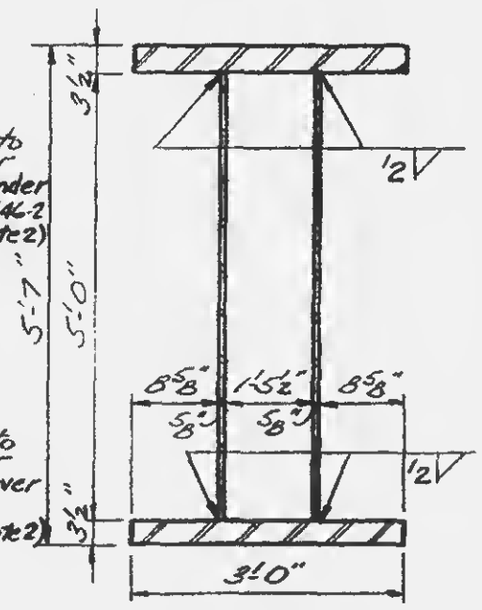
REVISIONS
1-8-69
4-30-69



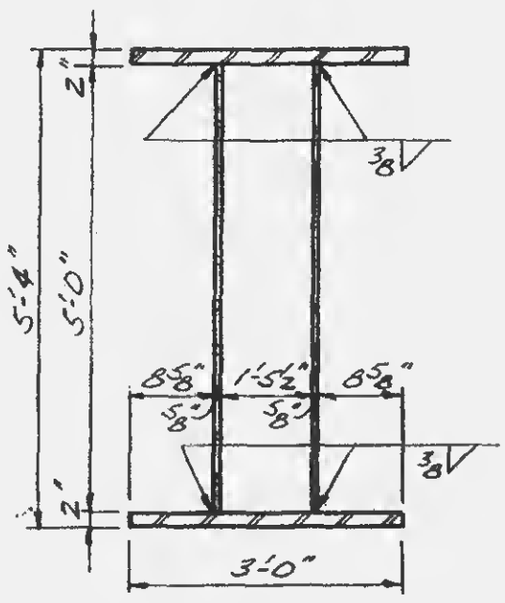
Elevation



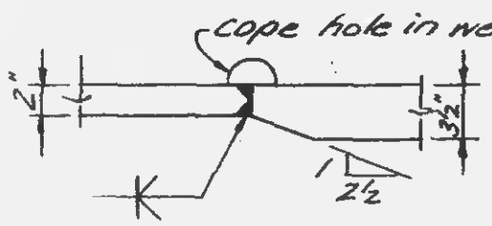
Section a-a



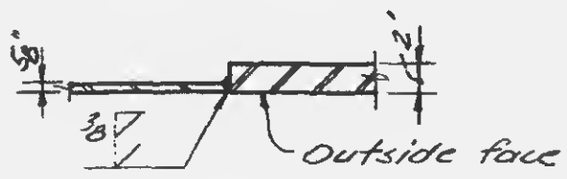
Section b-b



Section c-c



Detail 1



Section d-d

Note:
1. All material to be Fy42.
2. At contractor's option to use complete penetration weld 22" of column.

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No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN
A.F.

REVIEWED
E.L.

12-JK2-166

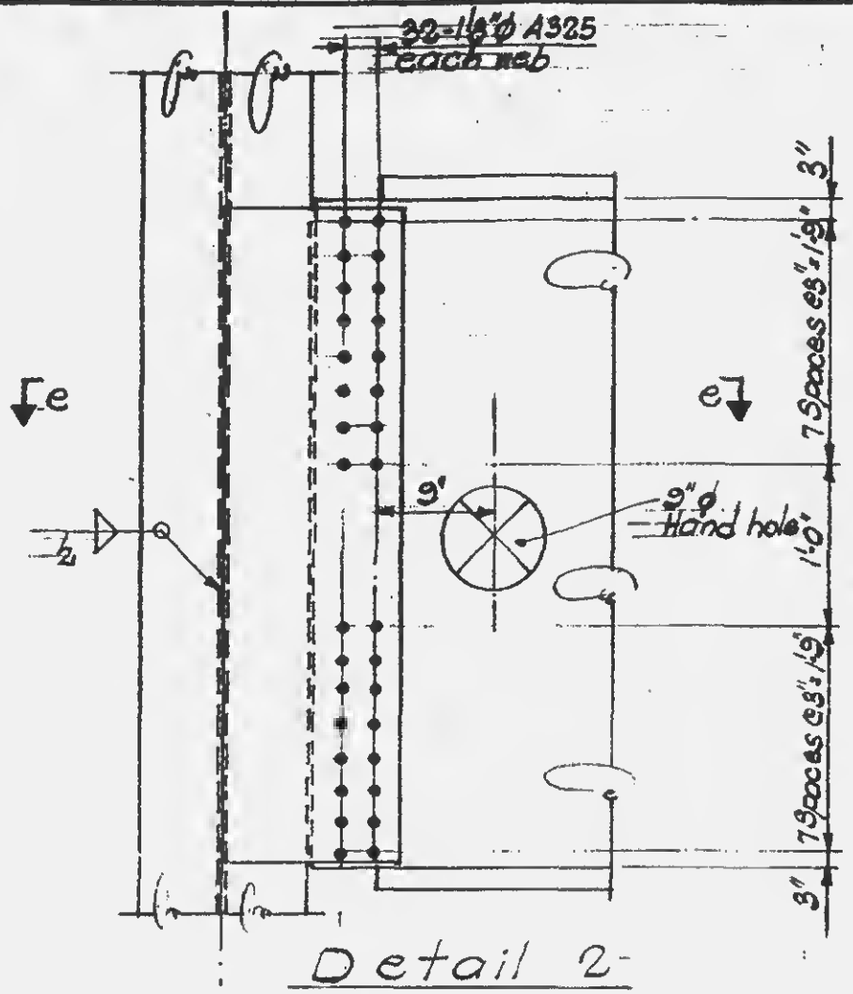
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER

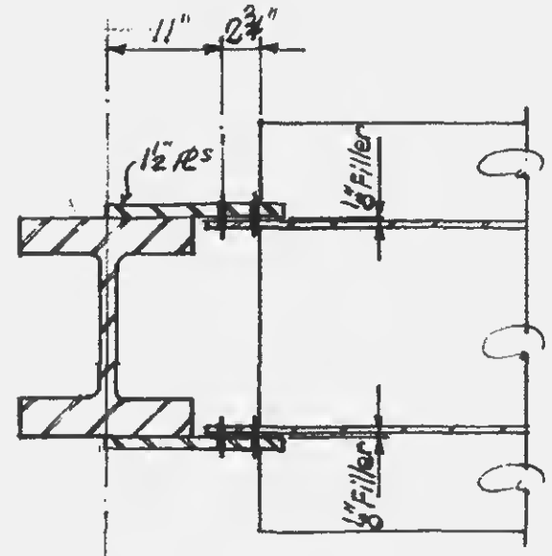
TITLE: DETAIL OF PLATE GIRDER

DATE: 12-1-68

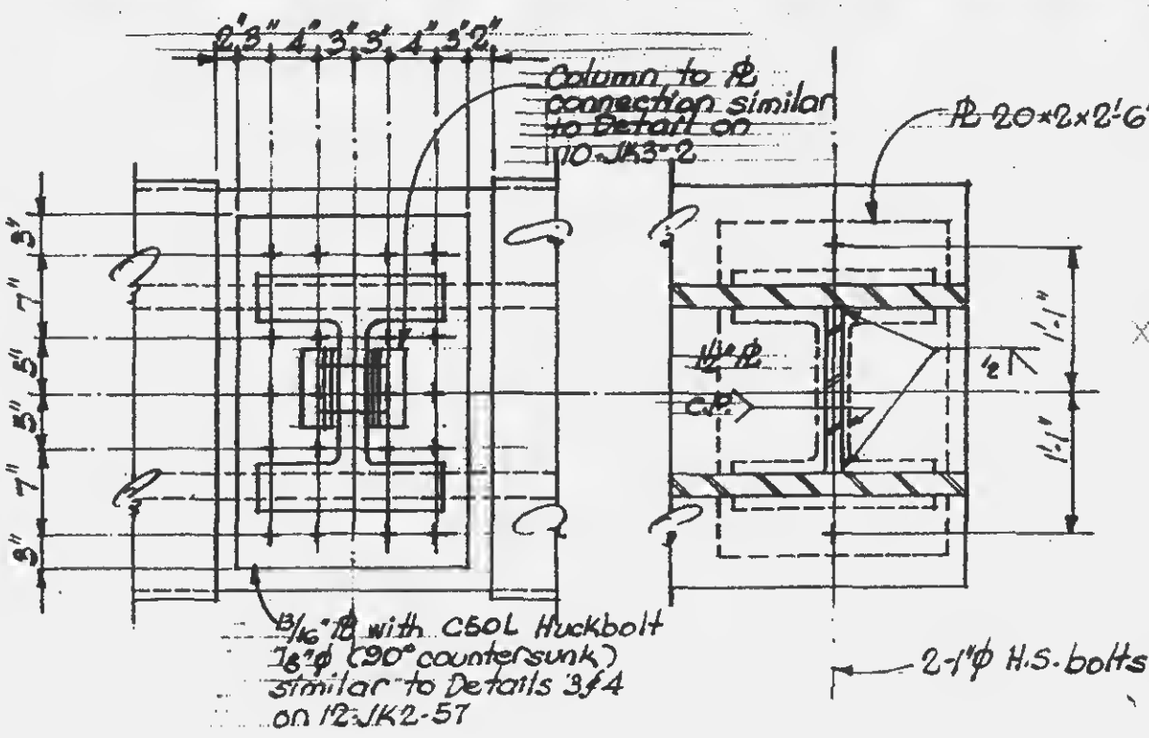
REVISIONS



Detail 2-



Section e-e



Detail 3

Detail 4

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DESIGNED

DRAWN

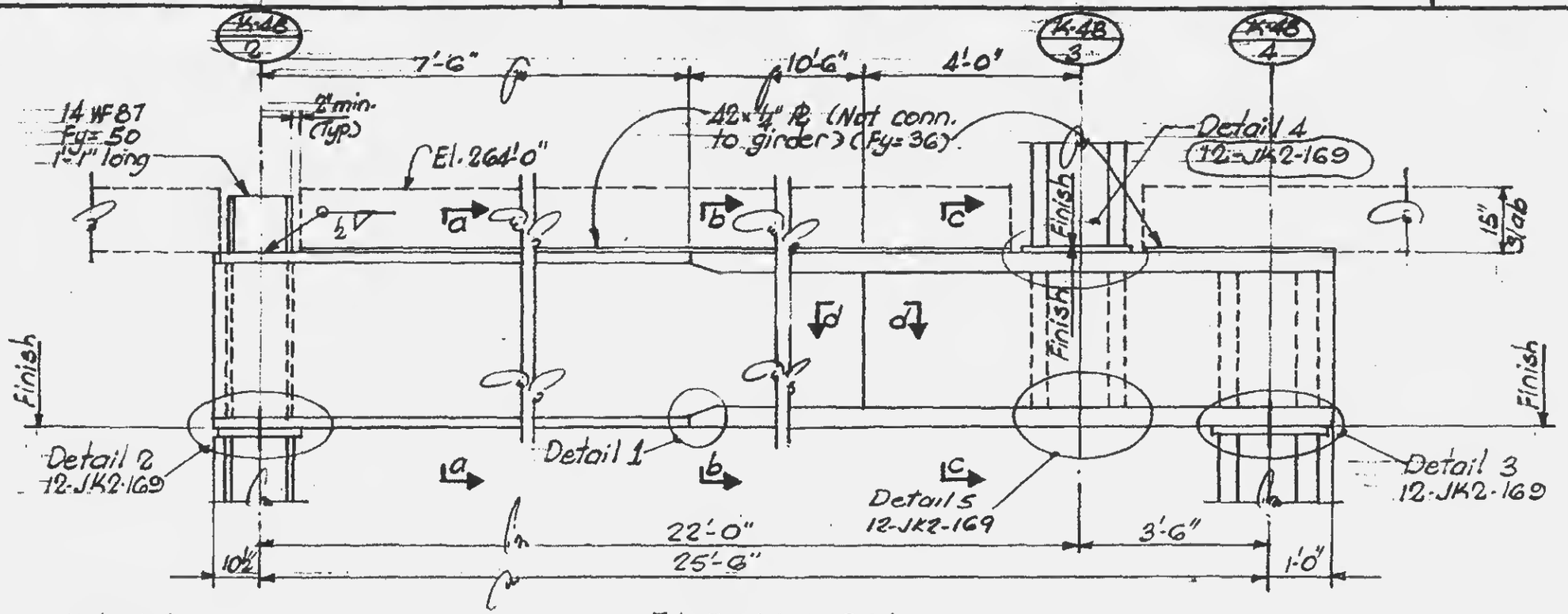
REVIEWED

12-JK2-167

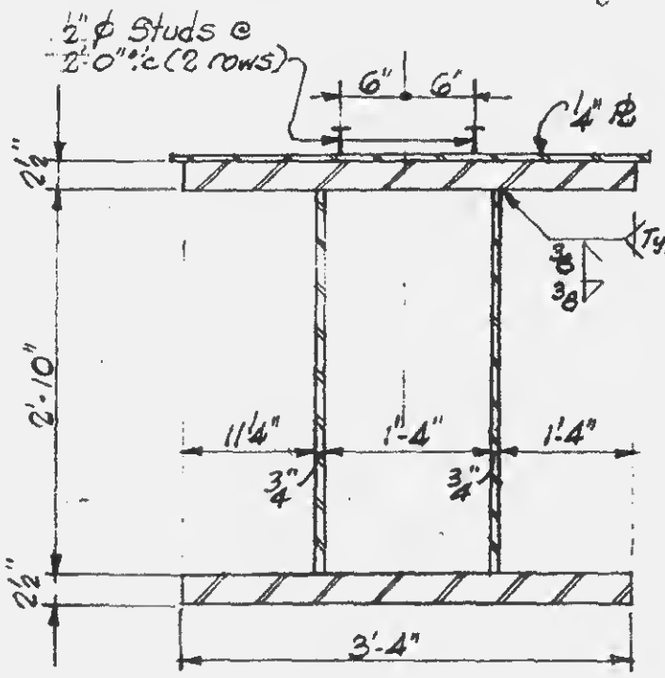
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 12-17-68

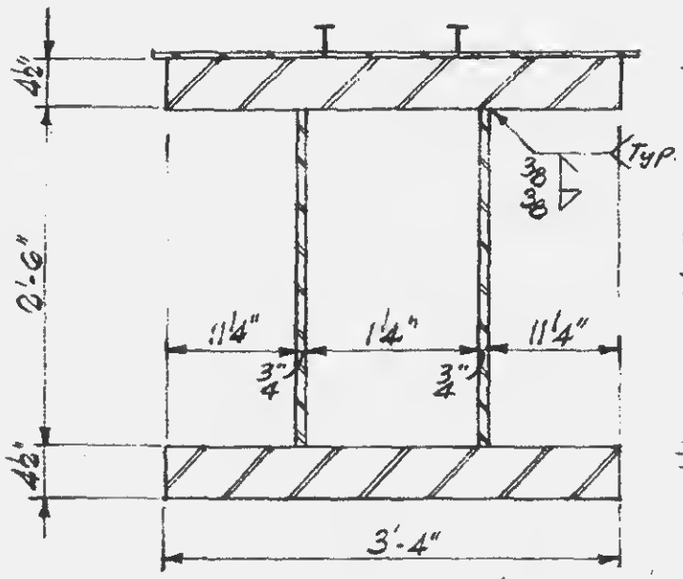
REVISIONS
2-19-69



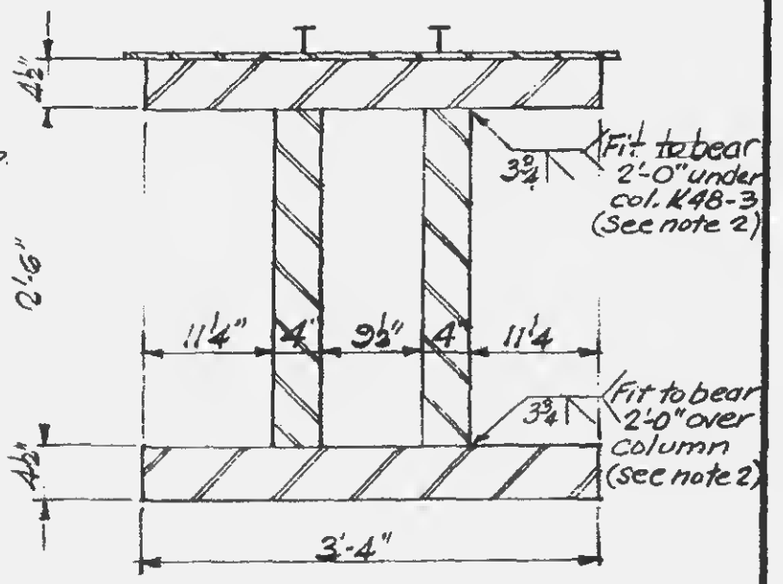
ELEVATION



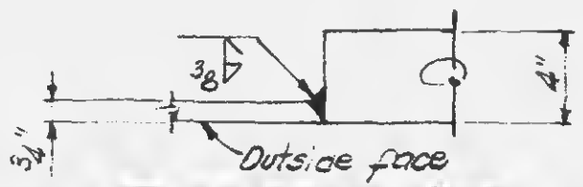
Section a-a



Section b-b



Section c-c



Section d-d



Detail 1

NOTE:
1. All material to be Fy=42 unless noted.
2. At contractor's option to use complete penetration weld 2'-0" at column

DESIGNED
DRAWN S.C.
REVIEWED E.L.

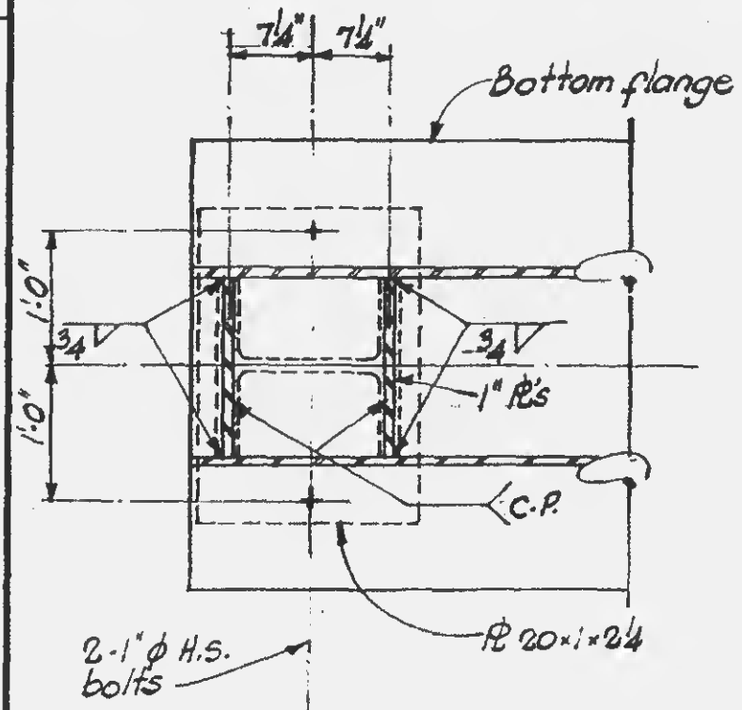
12-JK2-168

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

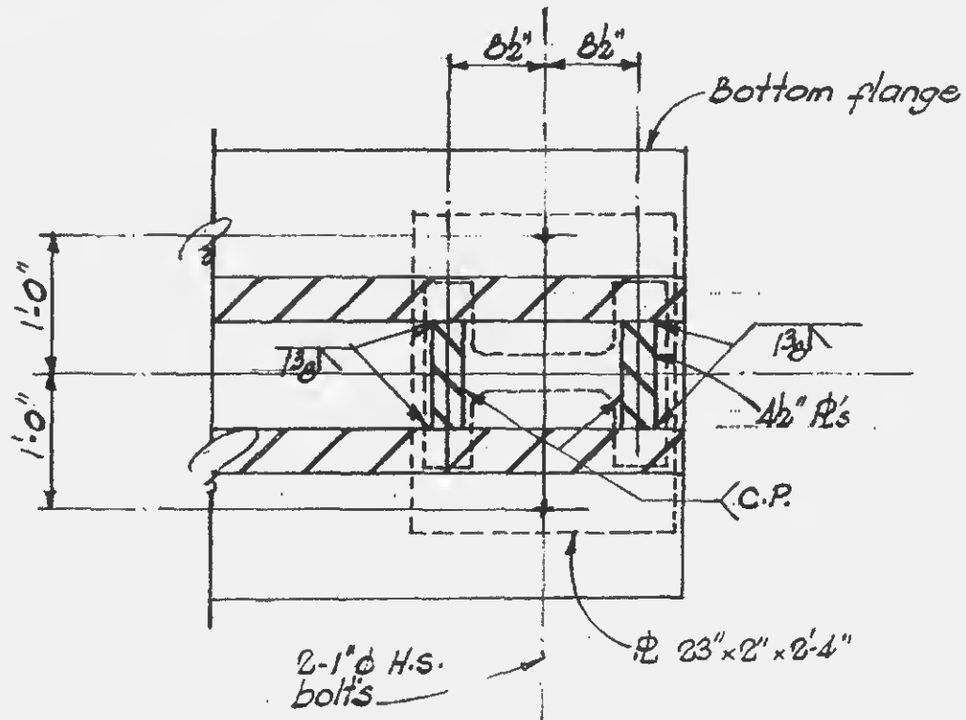
PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 12-17-68

REVISIONS

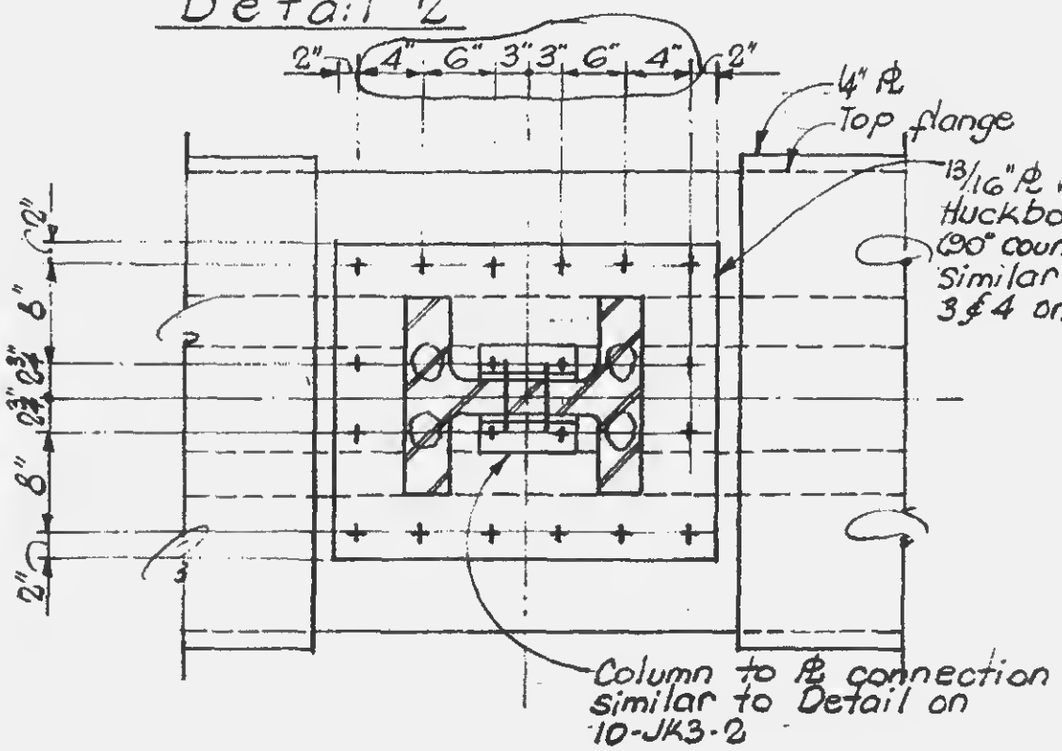
2-19-69



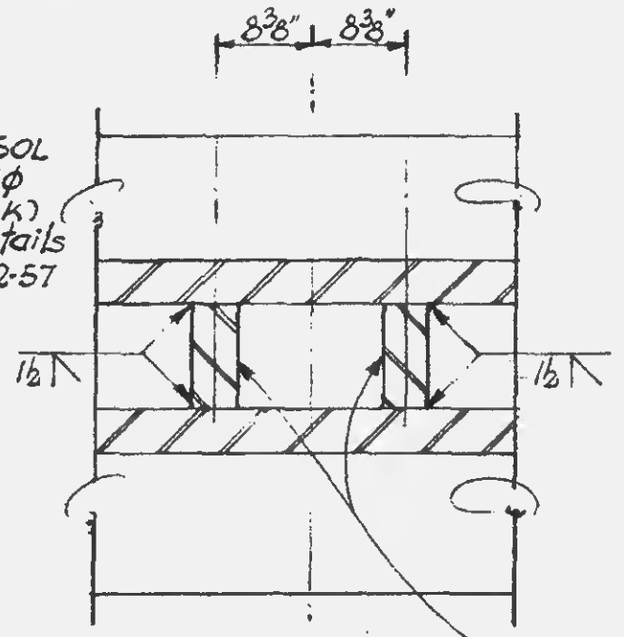
Detail 2



Detail 3



Detail 4



Detail 5

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN: S.C.

REVIEWED: E.L.

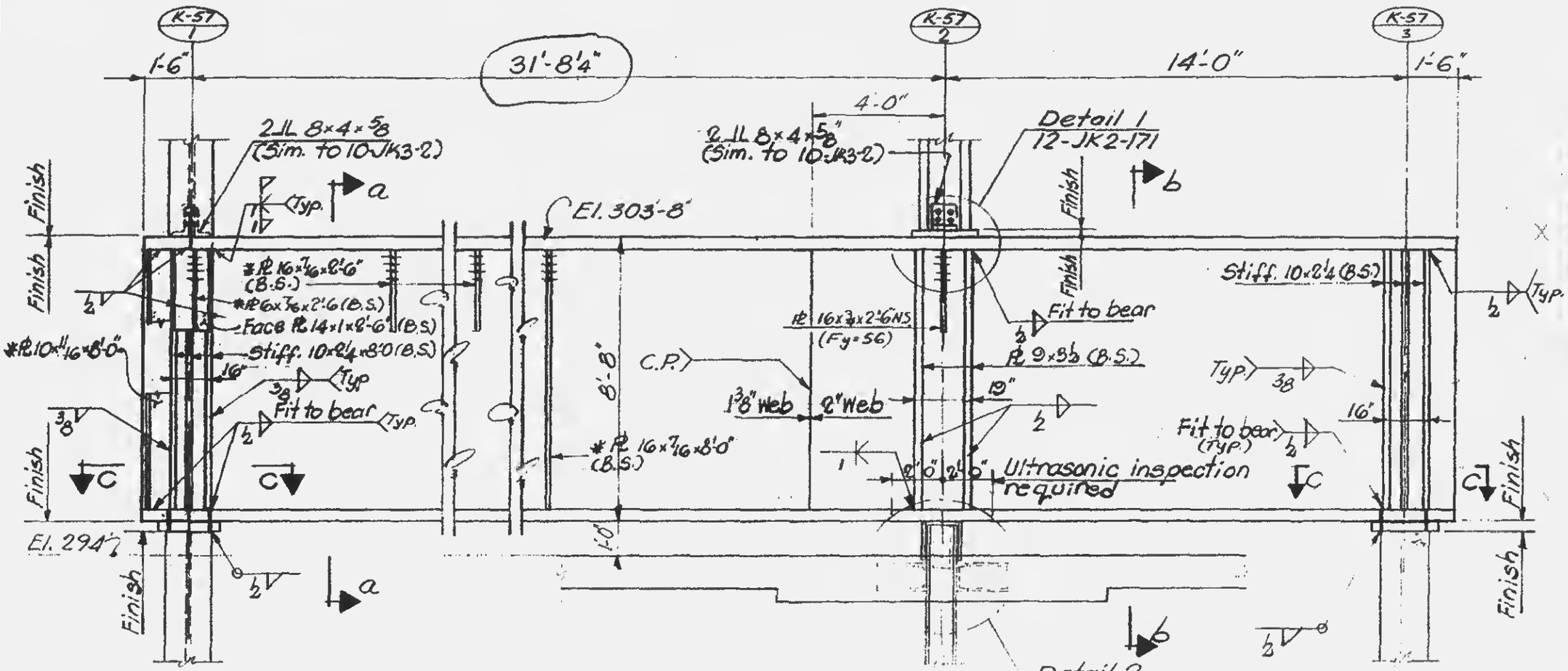
12-JK2-169

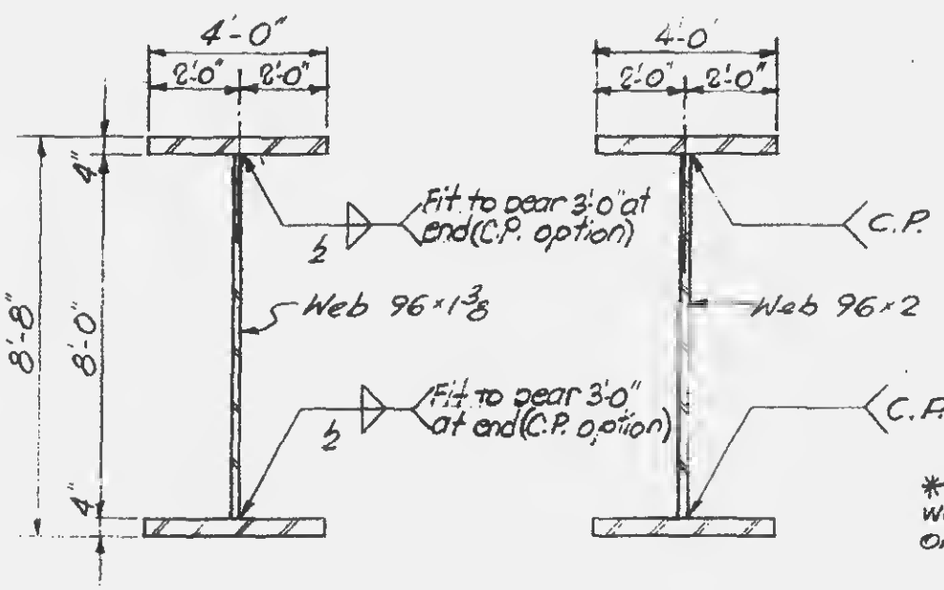
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAILS OF PLATE GIRDER | DATE: 3-21-69

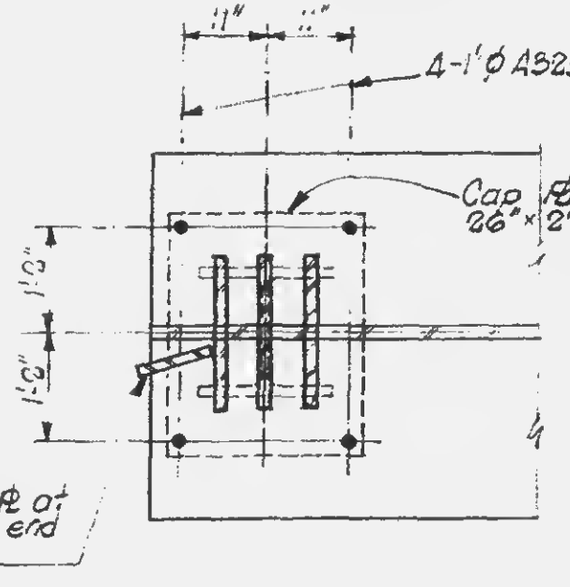
REVISIONS

5-29-69





Section a-a — Section b-b



Section c-c

Notes:
1. * PL skewed to line up with supported beam. Detail similar to 12-JK2-111 & 112.
2. All material to have Fy=42 K.S.I except as noted.
3. All welds to be E70xx.

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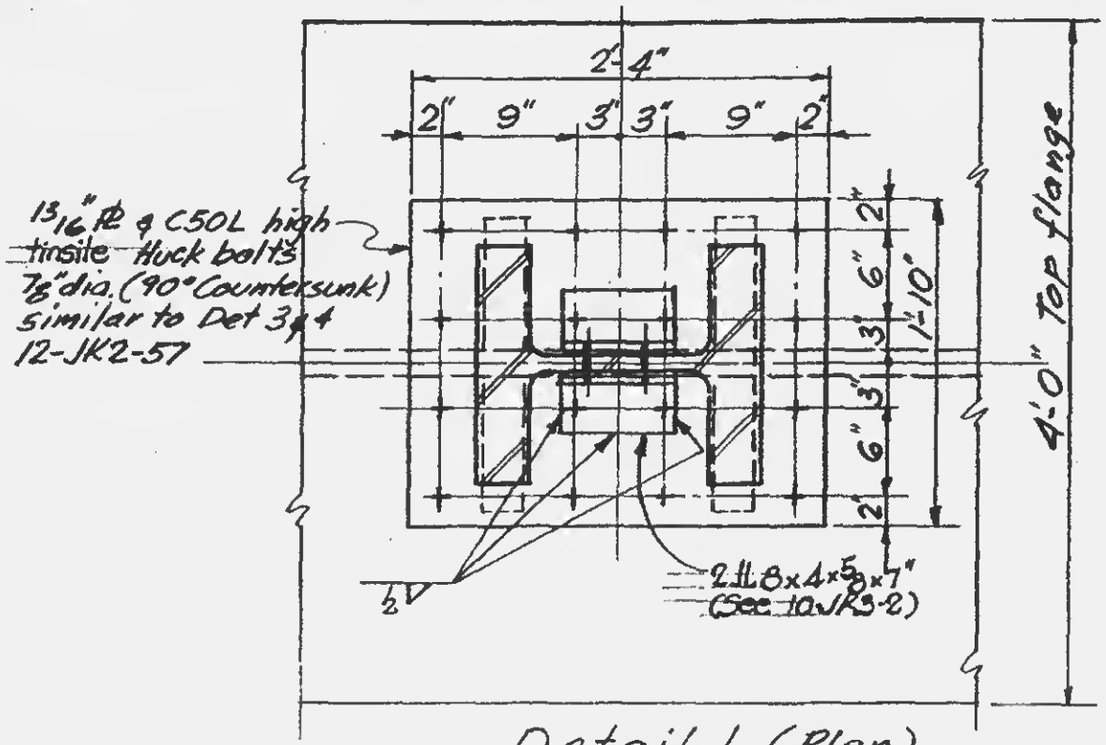
DESIGNED: J. Hufnagel
DRAWN: J. Gricius
REVIEWED: E.L.

12-JK2-170

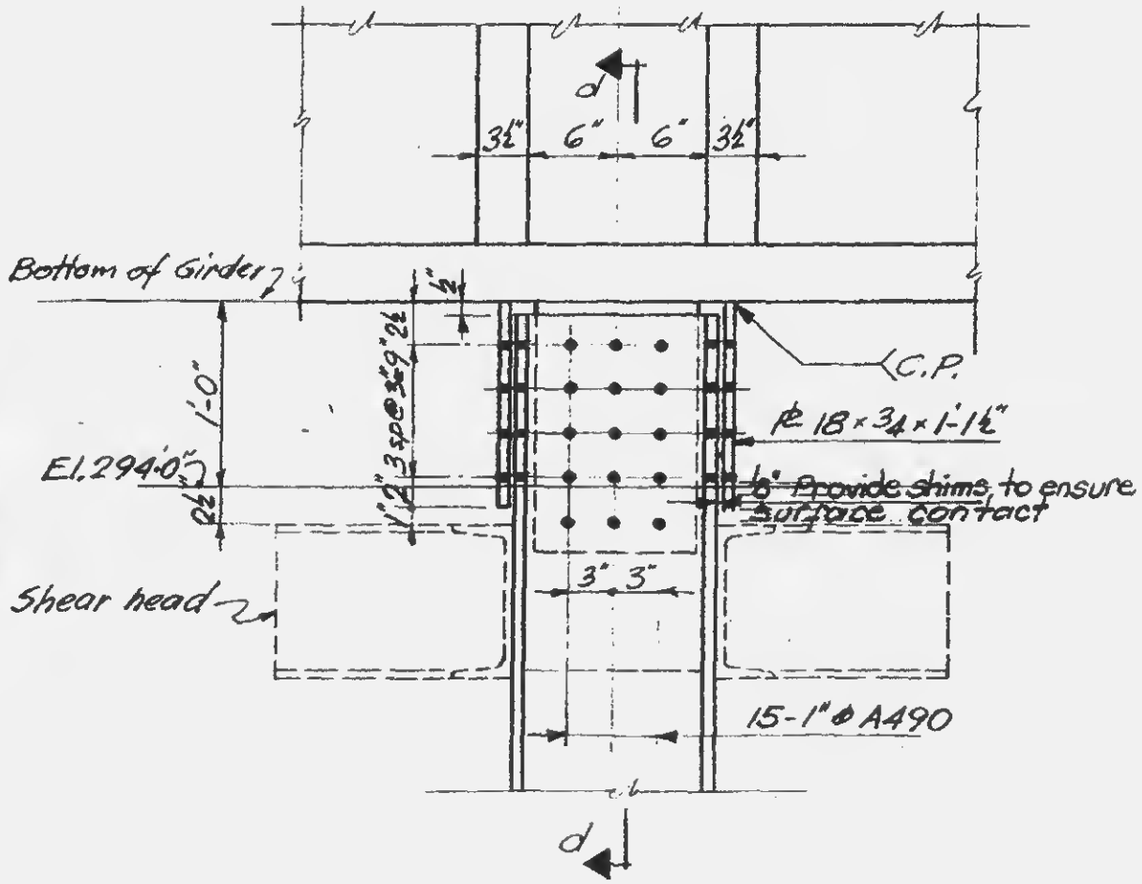
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAILS OF PLATE GIRDER | DATE 3-21-69

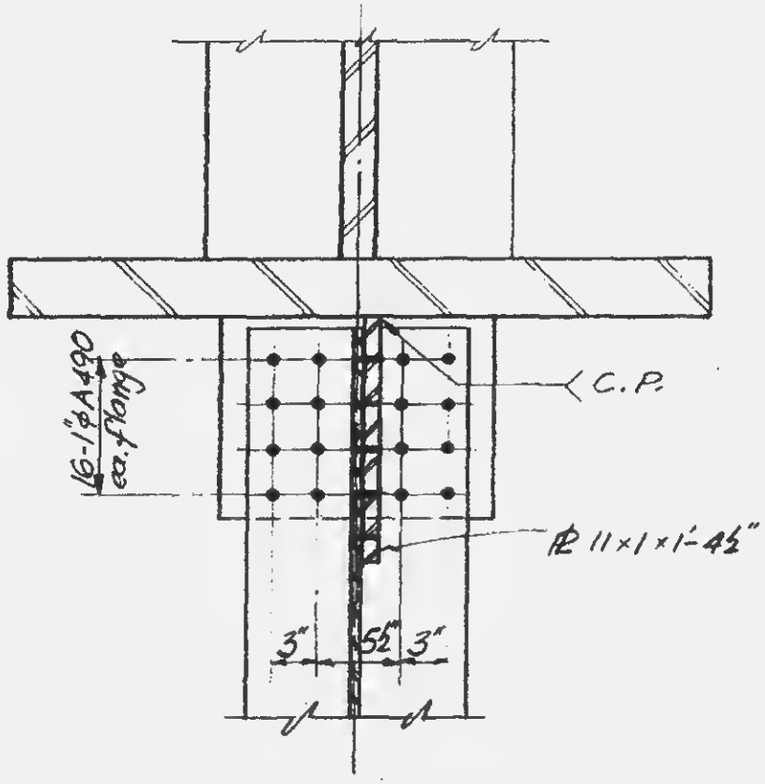
REVISIONS



Detail 1 (Plan)



Detail 2 (Elevation)



Section d-d

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED J. Hufnagel

DRAWN J. Gricius

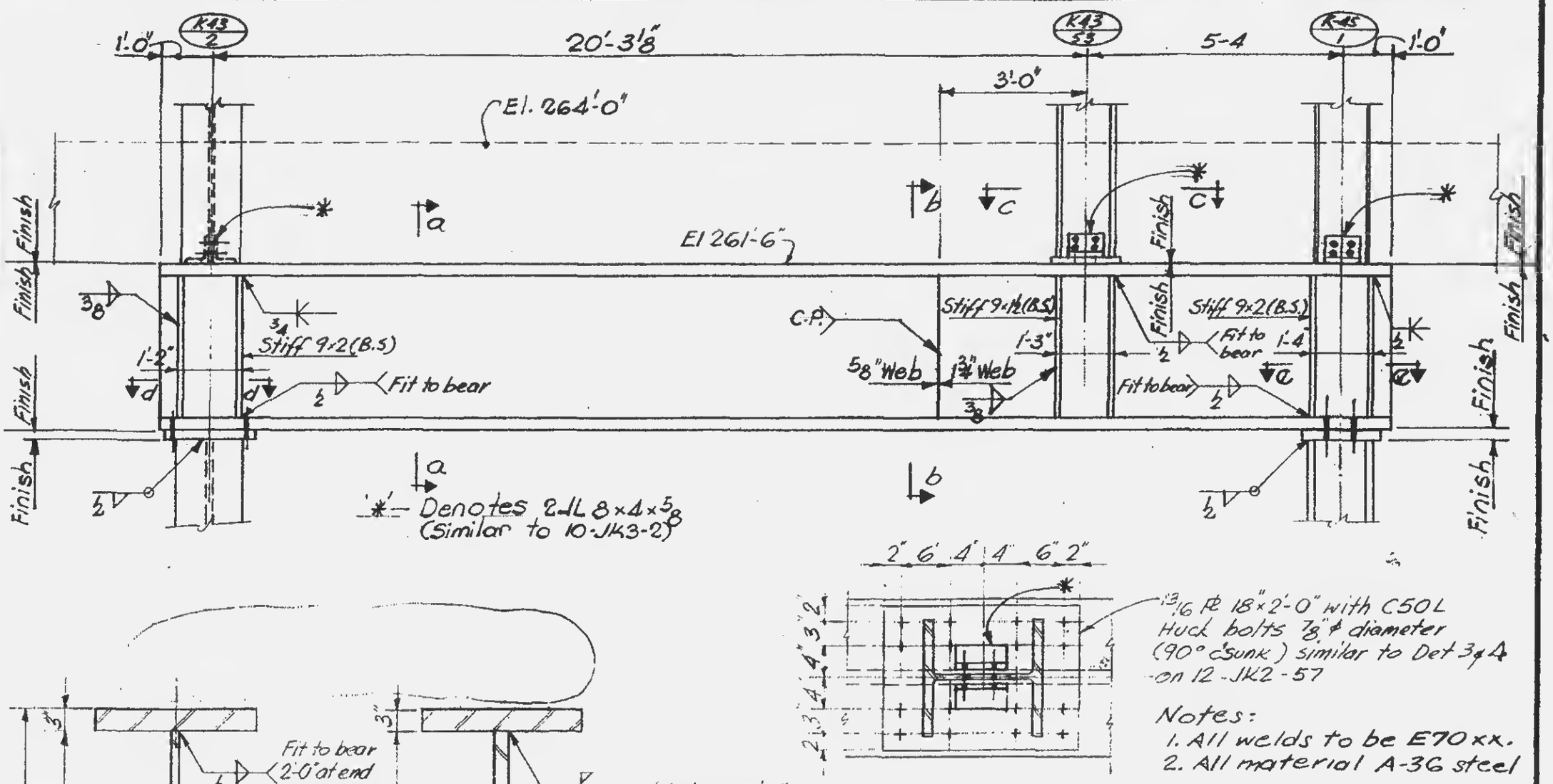
REVIEWED E.L.

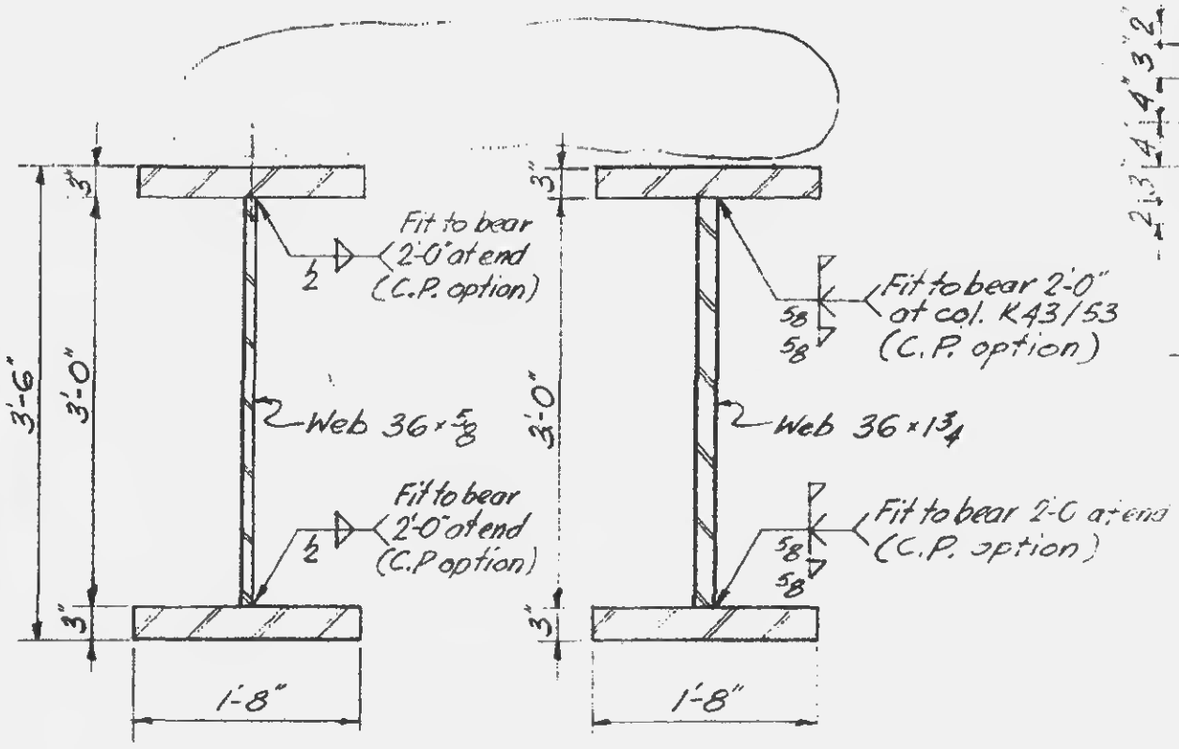
12-JK2-171

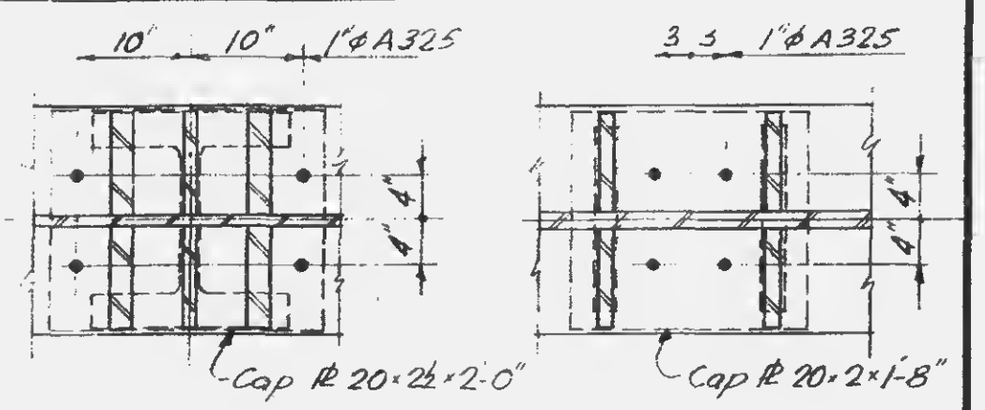
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAILS OF PLATE GIRDER | DATE: 3-12-69

REVISIONS
3-21-69







Section a-a | Section b-b | Section c-c | Section d-d | Section e-e

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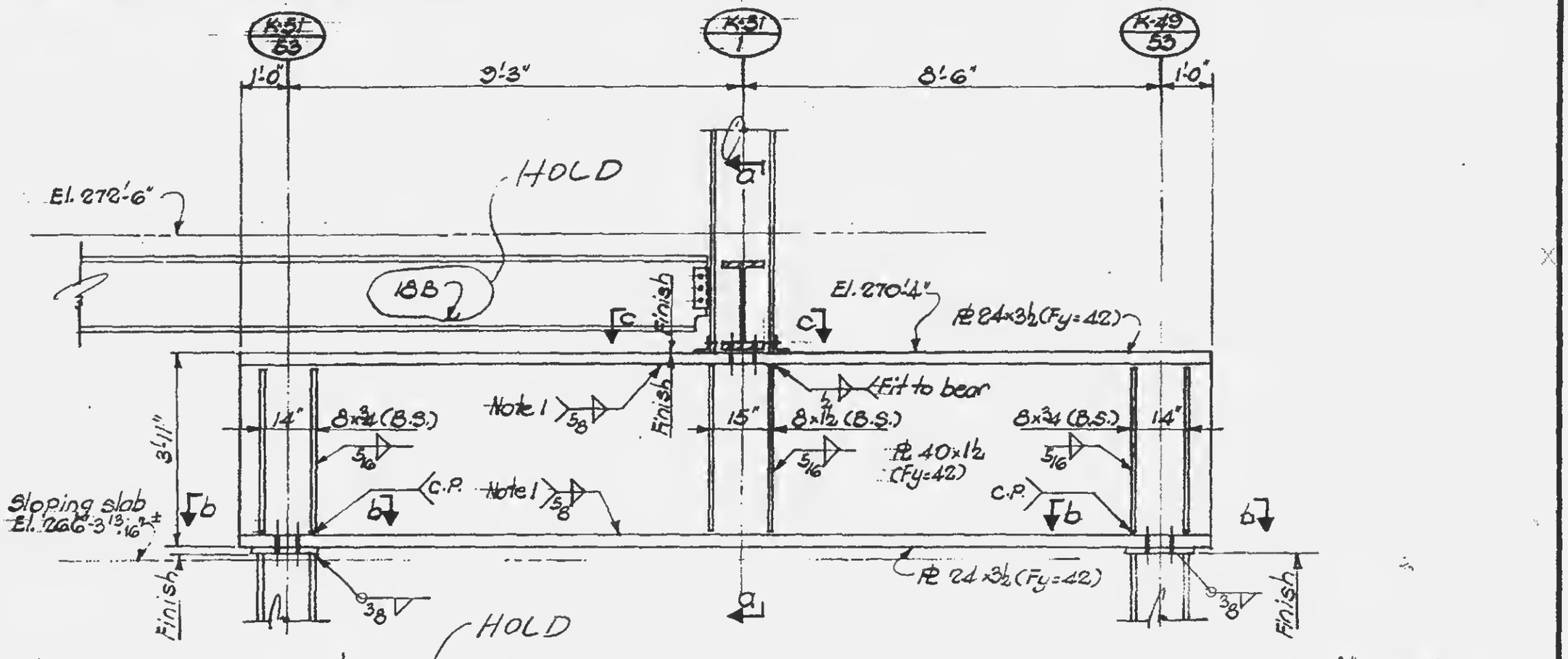
DESIGNED Hufnagel
DRAWN J. Gricius
REVIEWED E.L.

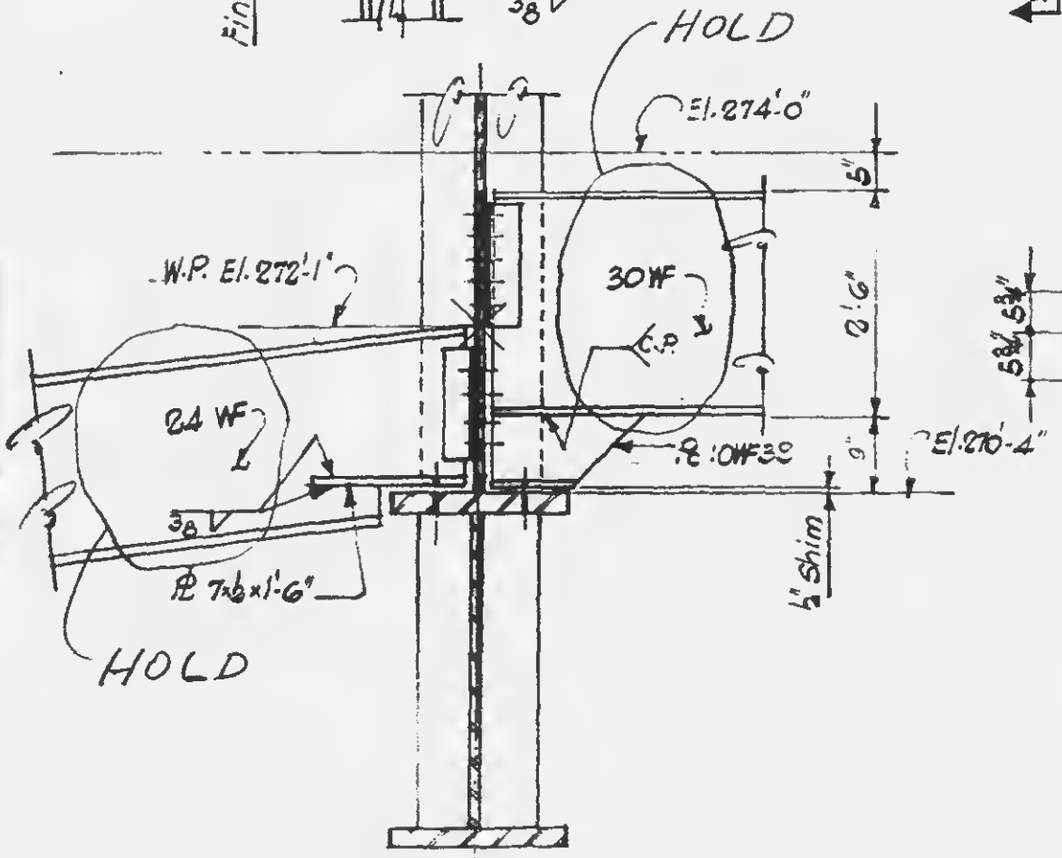
12-JK2-172

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

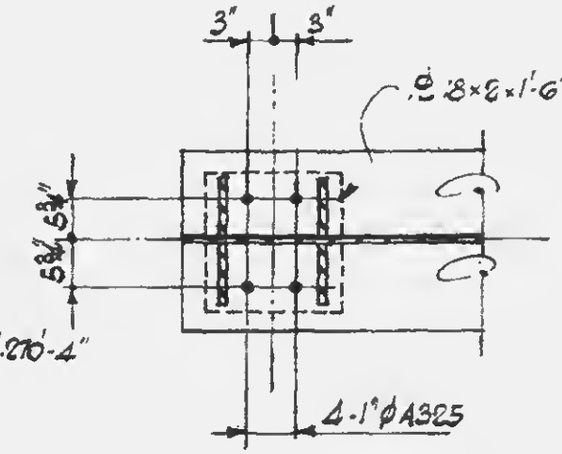
PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 3-12-69

REVISIONS

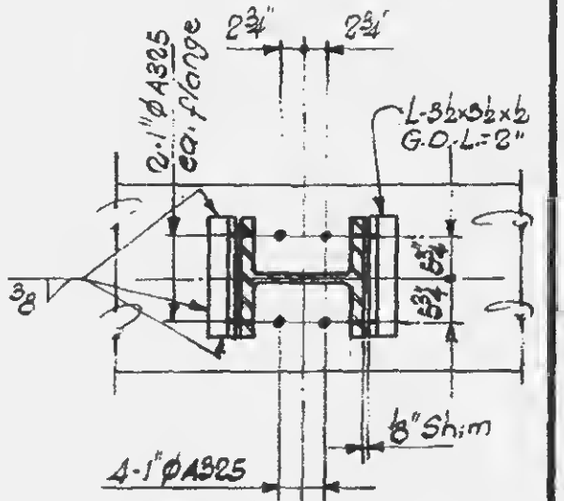




Section a-a



Section b-b



Section c-c

NOTES:

1. Fit web to bear for distance of 2'-0" at columns (loaded flange only), or C.P. weld for same distance at Contractors option.
2. All welds to be E70xx.
3. All PLs to be A-36 steel, except as noted.

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

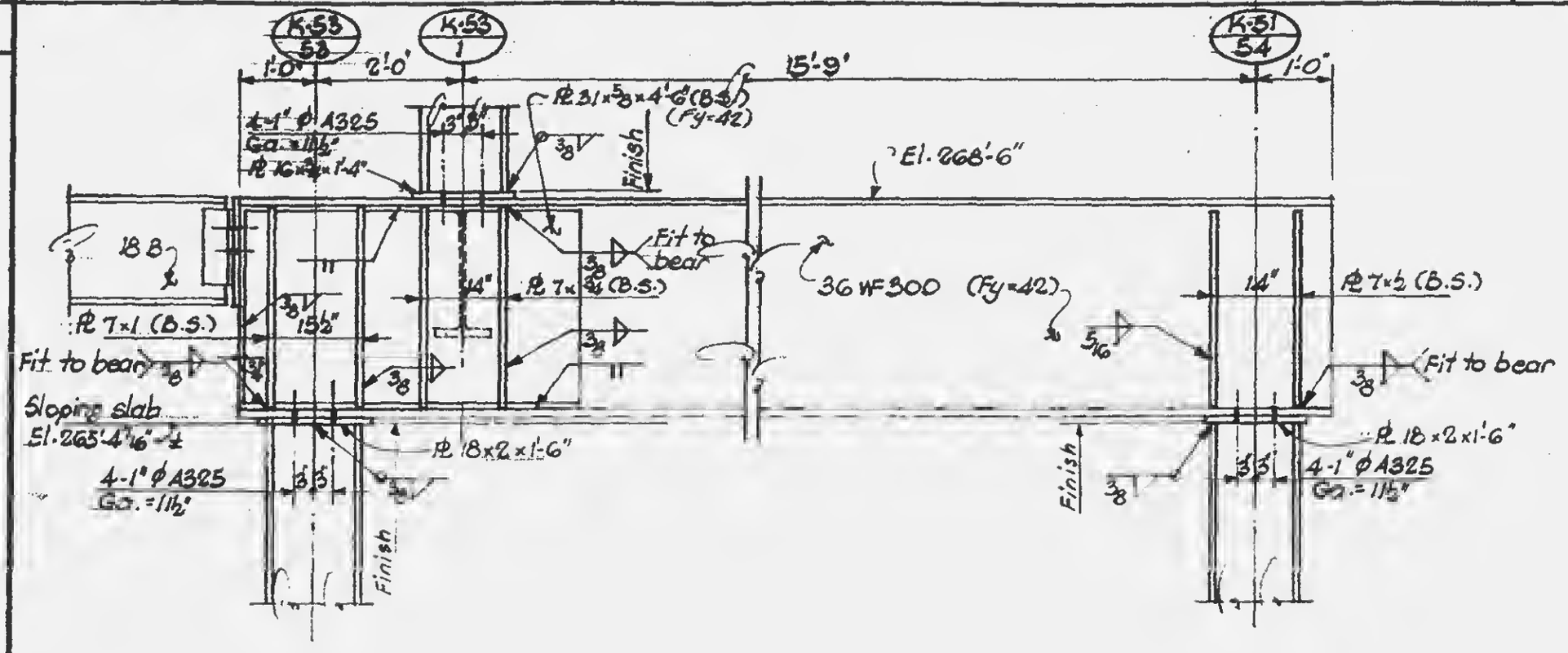
DESIGNED J. Hufnagel
DRAWN S.F.M.
REVIEWED E.L.

12-JK2-173

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT THE WORLD TRADE CENTER | TITLE DETAIL OF PLATE GIRDER | DATE 3-12-69

REVISIONS



Notes:
1. All welds to be E70xx.
2. All PLs to be A-36 steel except as noted.

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 28260 — NEW YORK — UNIVERSITY

DESIGNED J. Hufnagel

DRAWN G.T.M.

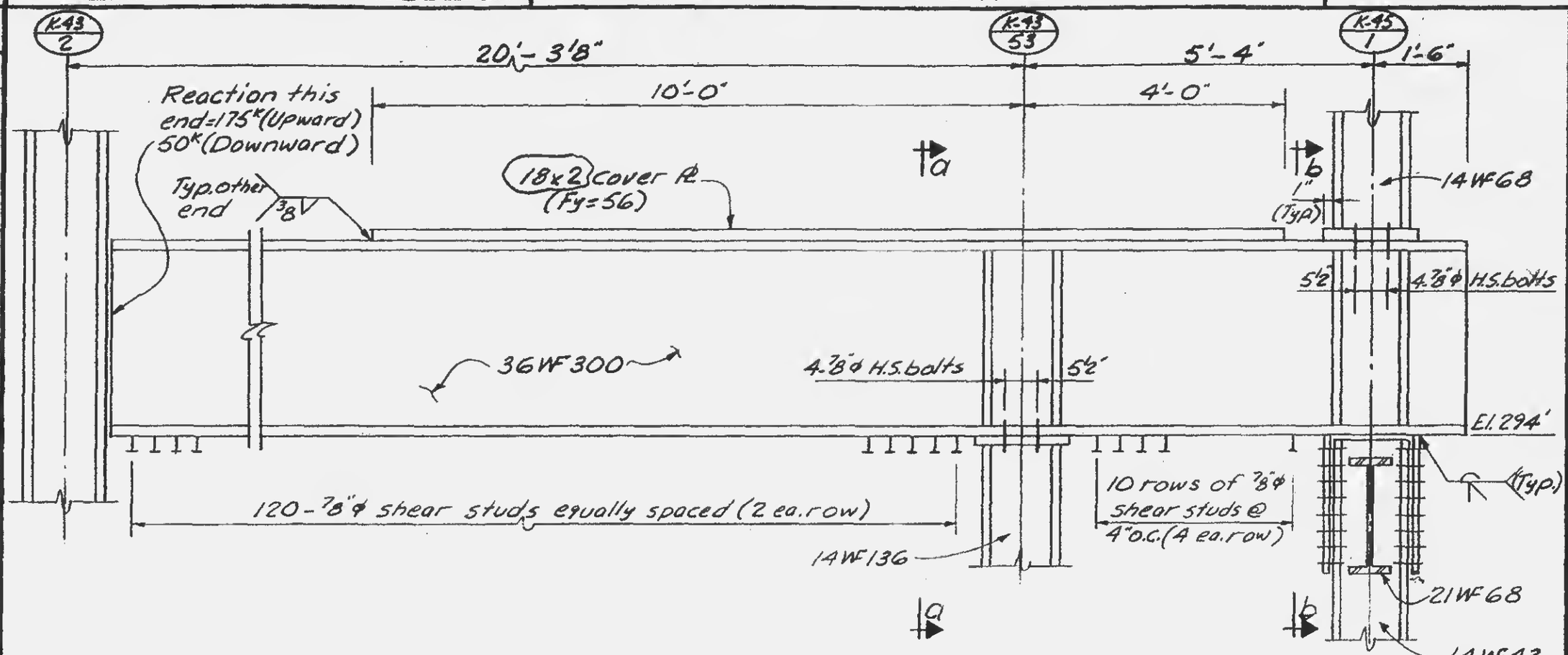
REVIEWED E.L.

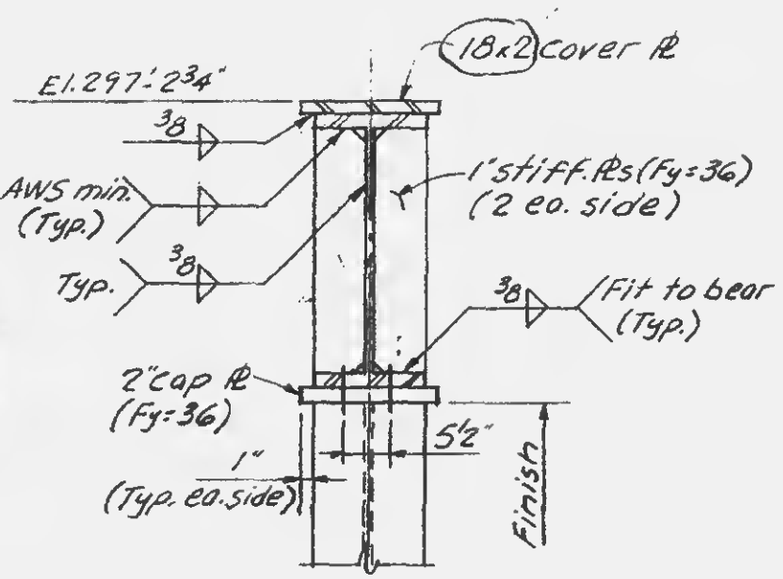
12-JK2-174

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

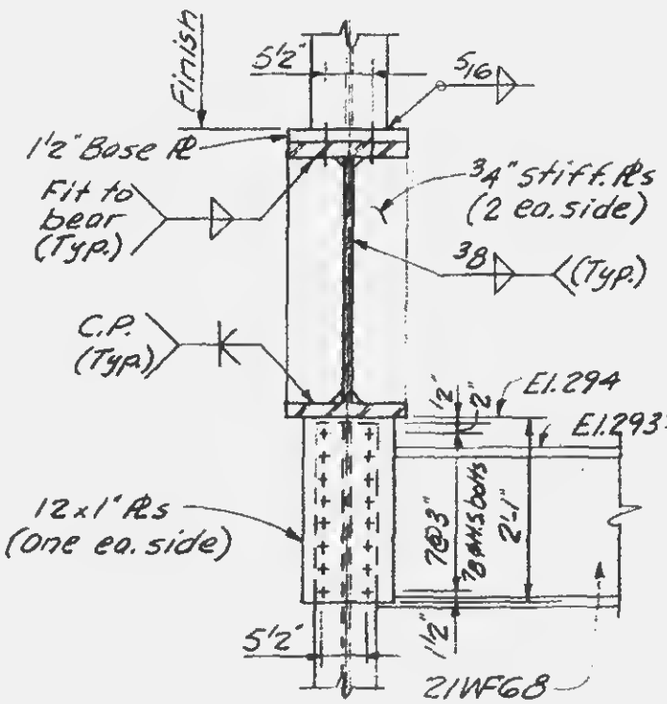
PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL OF PLATE GIRDER | DATE: 3-21-69

REVISIONS
4-18-69





Section a-a



Section b-b

Notes:
1. All welds to be E70xx.
2. All bolts to be A-325 friction type H.S. bolts.
3. Column cap Pl detail similar to detail 104(10-JK2-7)

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN A.L. FRANQUI

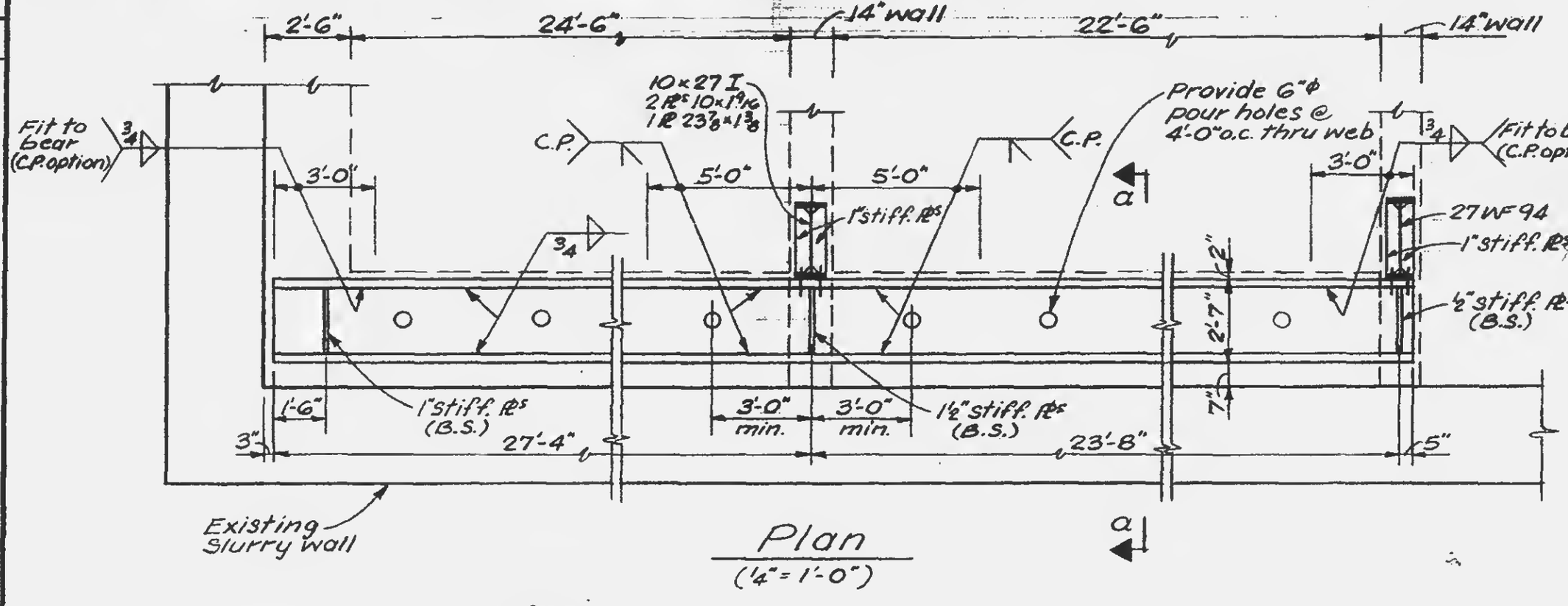
REVIEWED E.L.

12-JK2-175

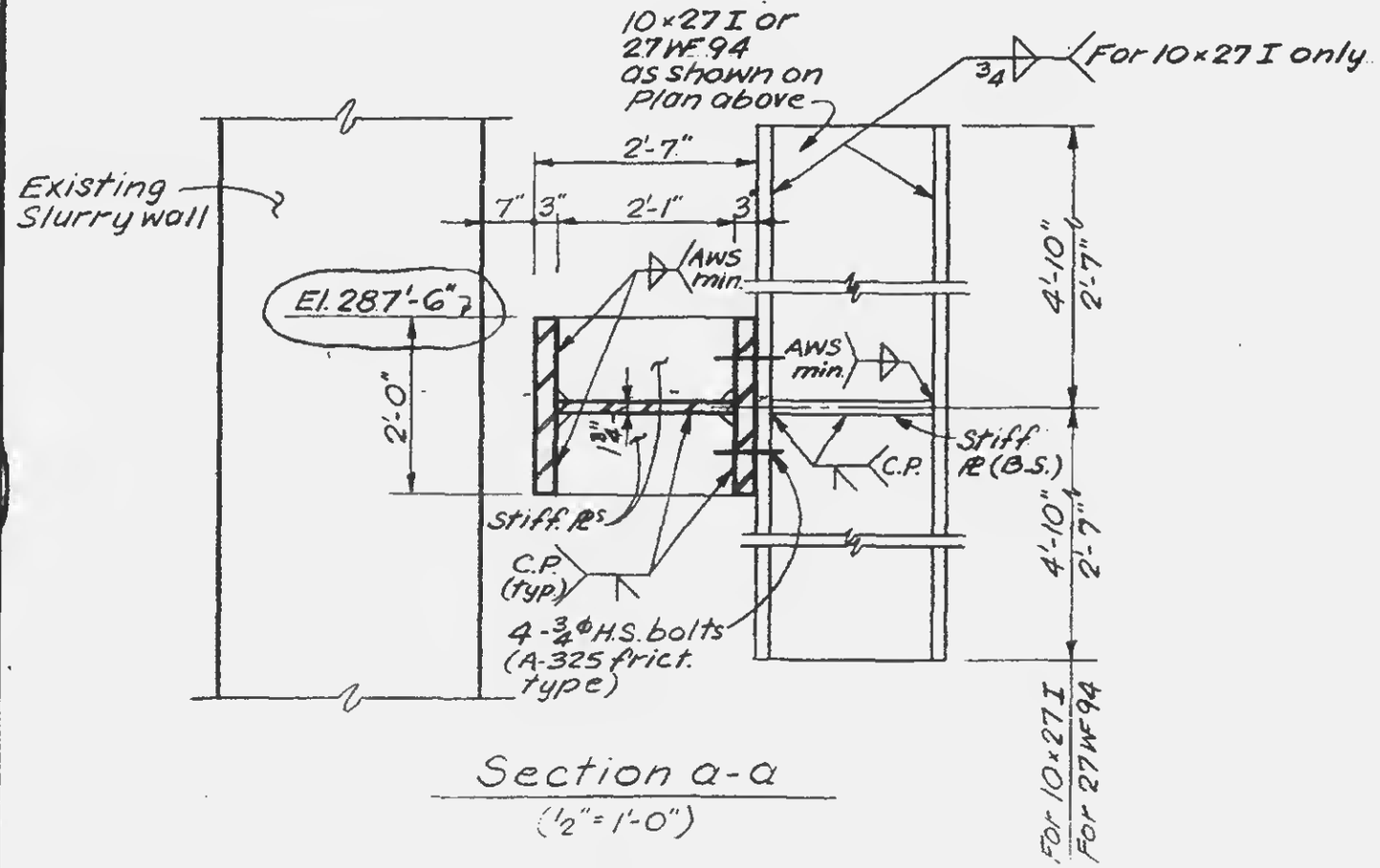
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAILS OF PLATE GIRDER | DATE: 9-17-69

REVISIONS
4-8-70



Plan
(1/4" = 1'-0")



Section a-a
(1/2" = 1'-0")

Notes:
1. All material shown to hove Fy = 42 ksi.
2. All welds to be E70xx

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN
S.C.

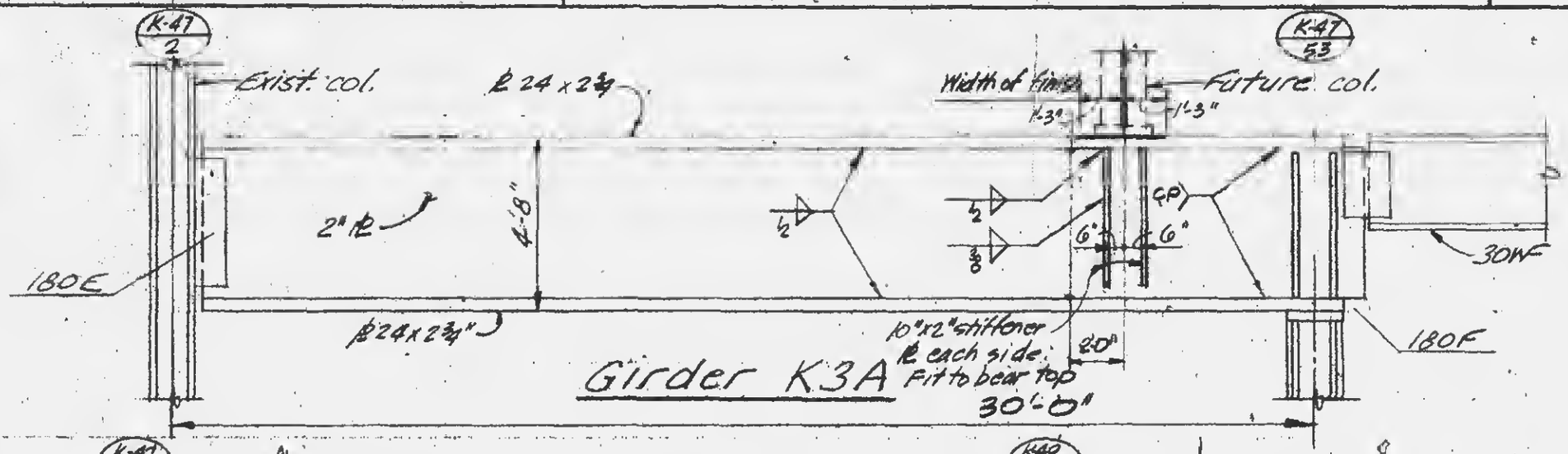
REVIEWED
E.L.

12-JK2-176

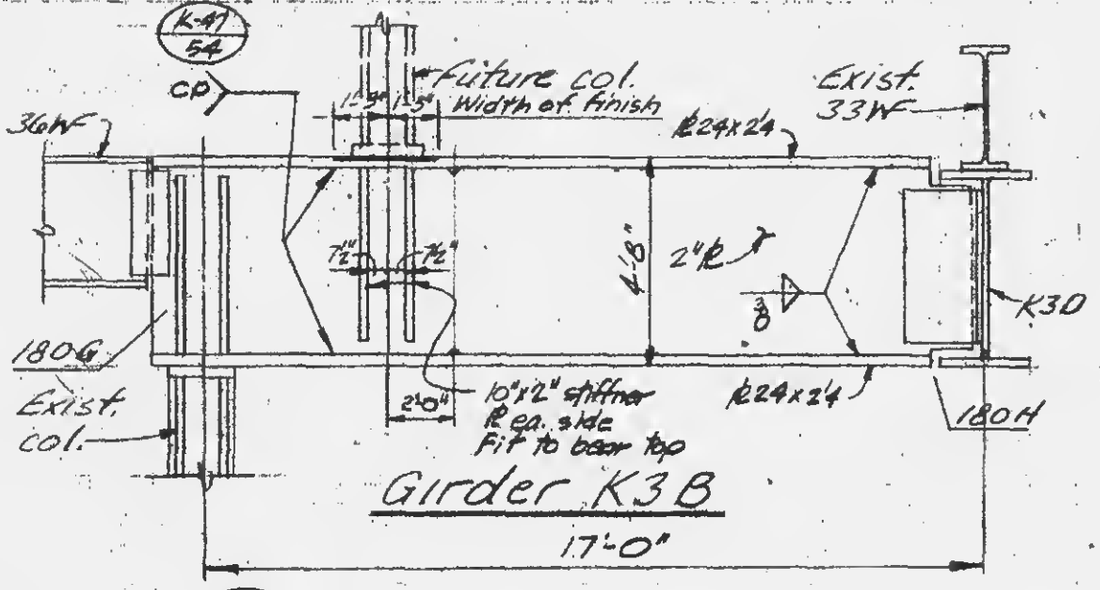
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: GIRDERS . EL 310 | DATE: 9/15/71

REVISIONS

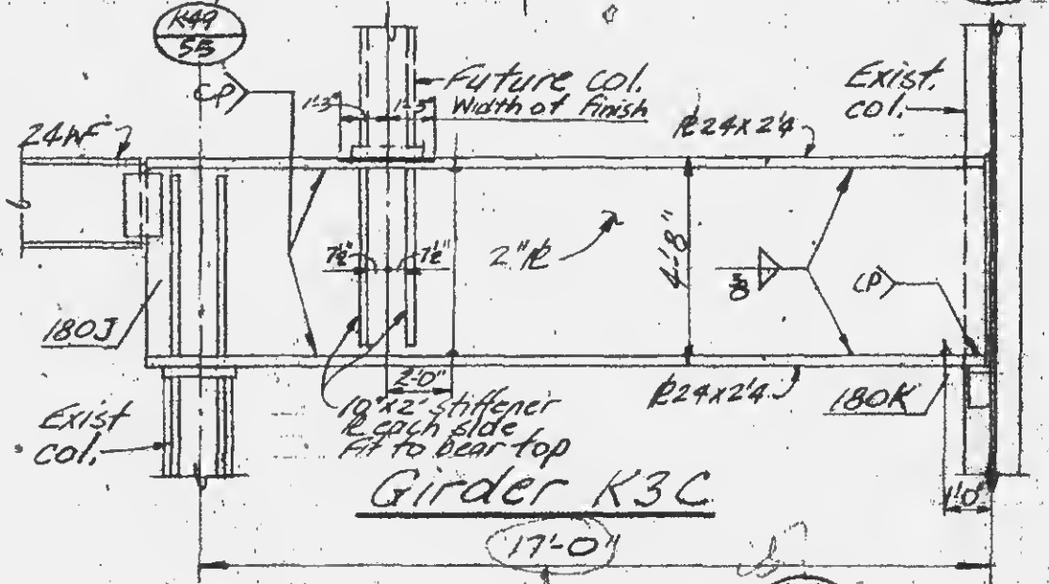


Girder K3A



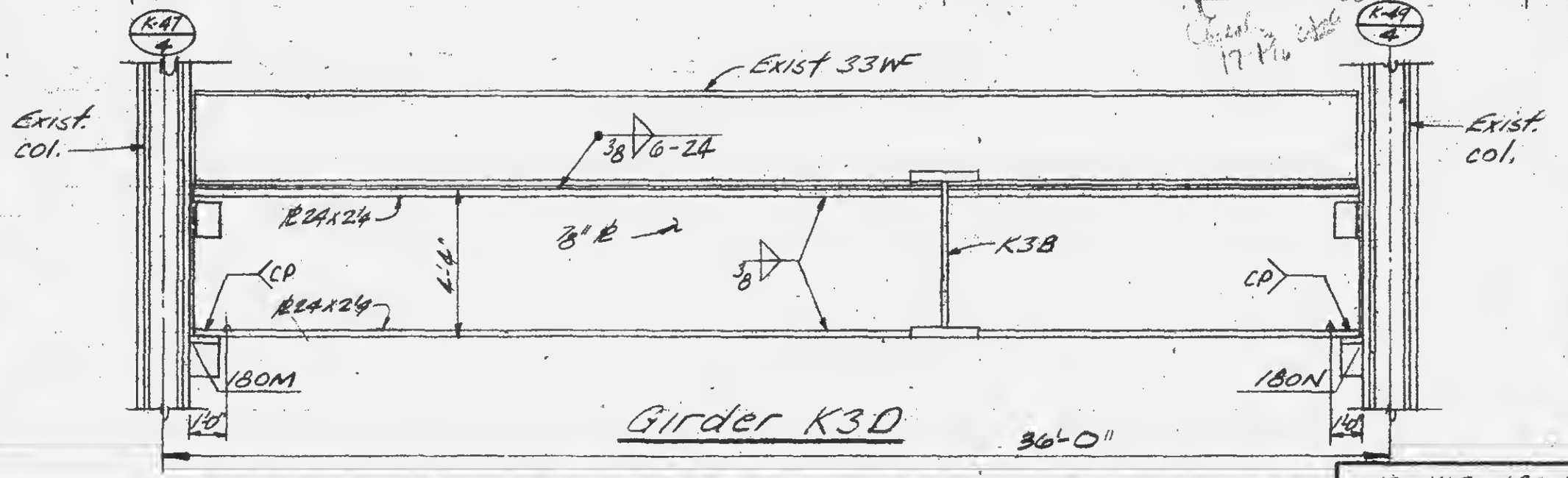
Girder K3B

17'-0"



Girder K3C

17'-0"



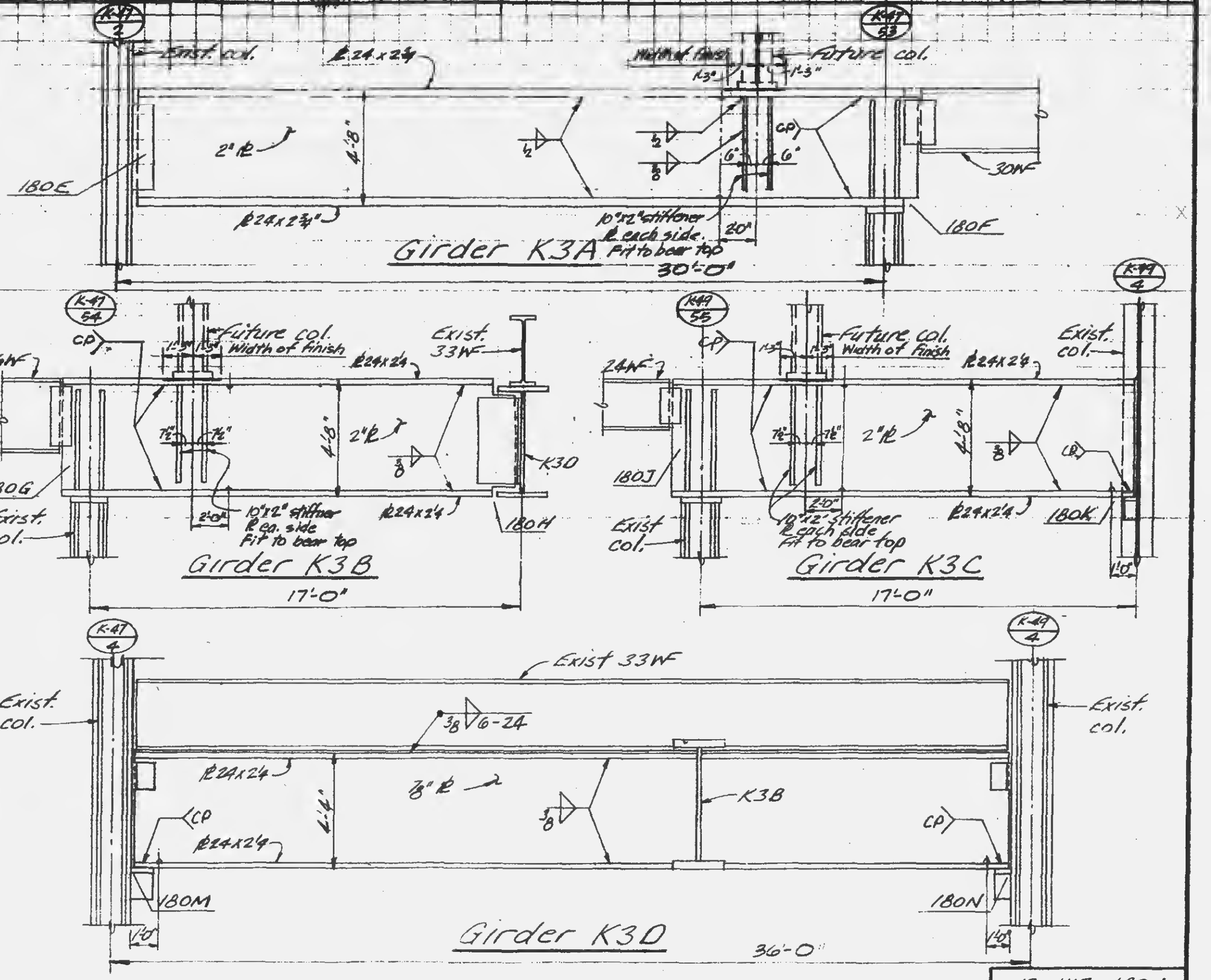
Girder K3D

36'-0"

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34960 — UNIVERSITY OF THE STATE OF NEW YORK

SIGNED: L E Rob
DRAWN: PM Sulli
REVIEWED

12-JKZ-180.1



LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

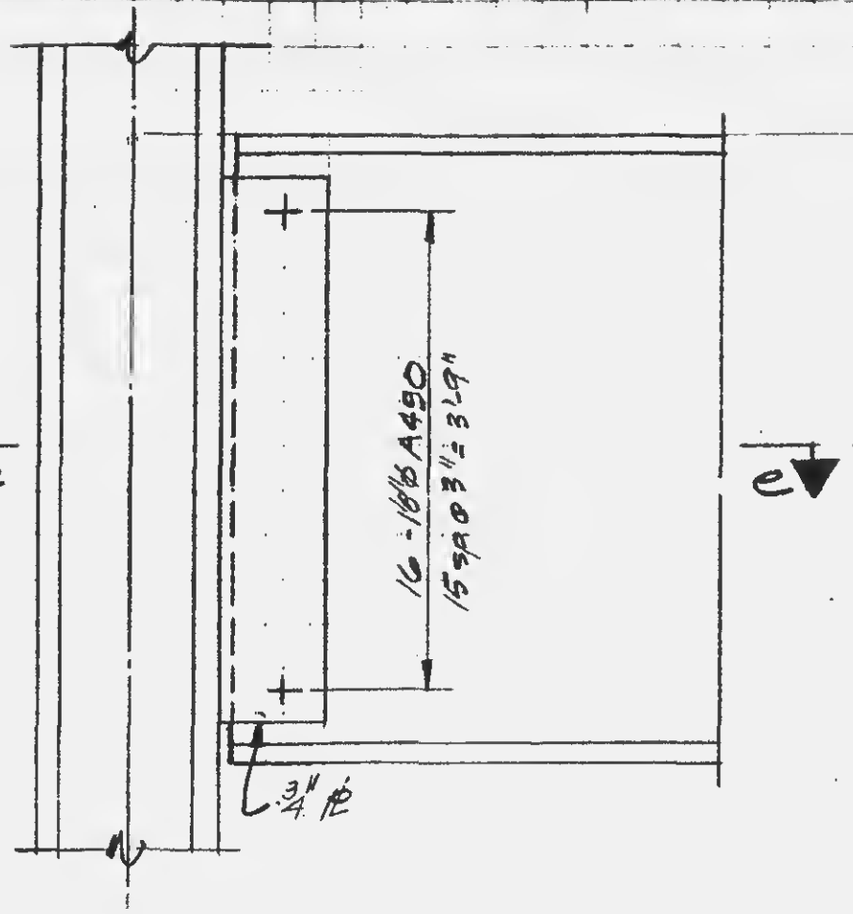
DESIGNED J. Rer
DRAWN
REVIEWED

12-JKZ-180.1

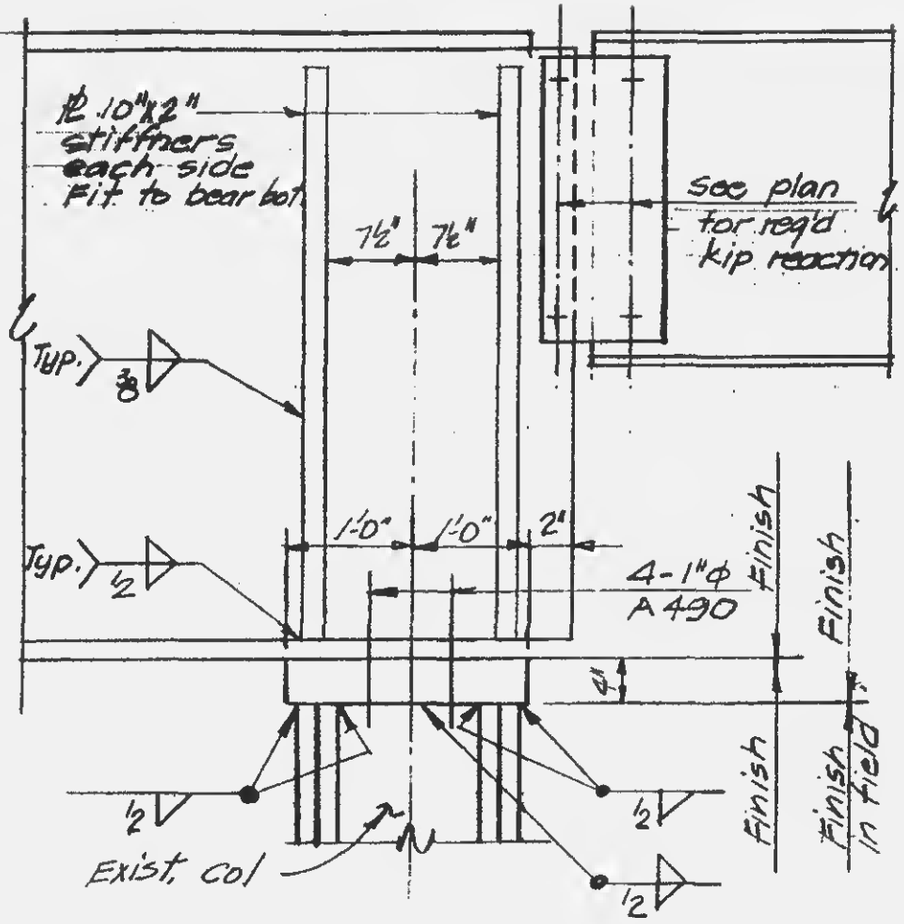
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — CONSULTING STRUCTURAL ENGINEERS

PROJECT THE WORLD TRADE CENTER — TITLE [illegible] — DATE 4-15-71

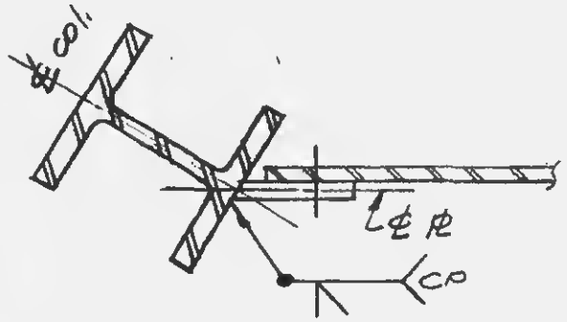
REVISIONS



Detail 180 E



Detail 180F



Section e-e

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

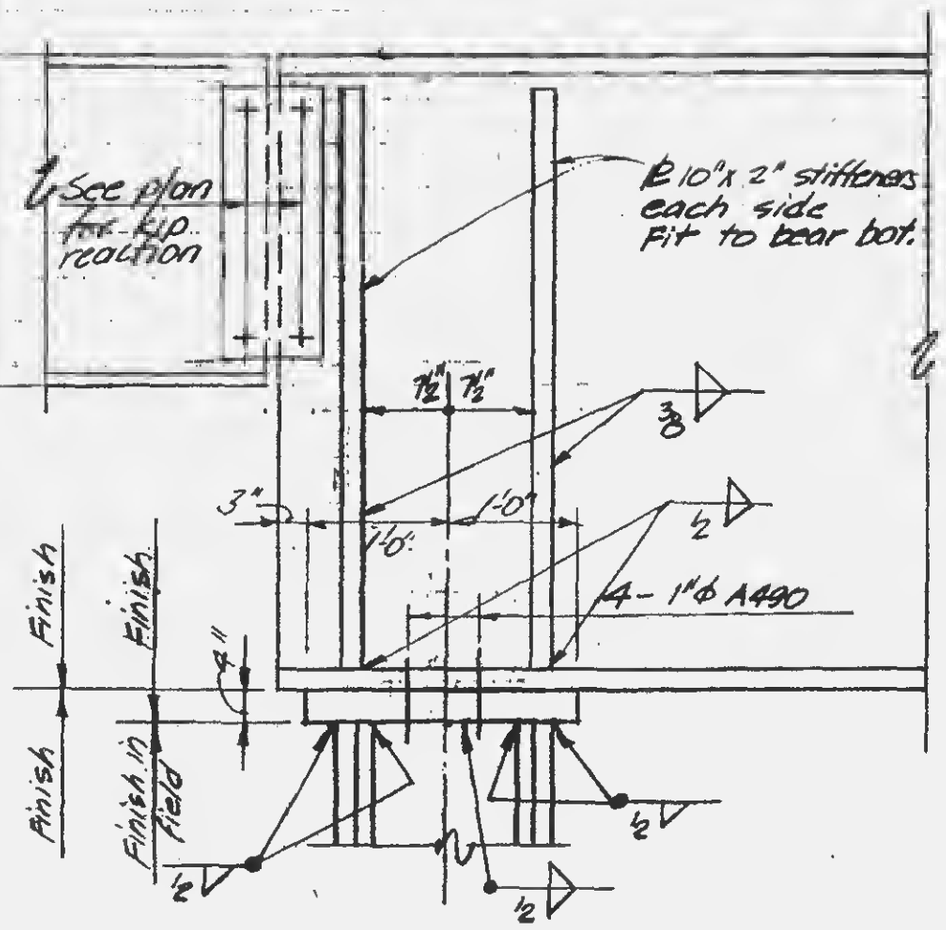
DESIGNED H. Rossi

DRAWN

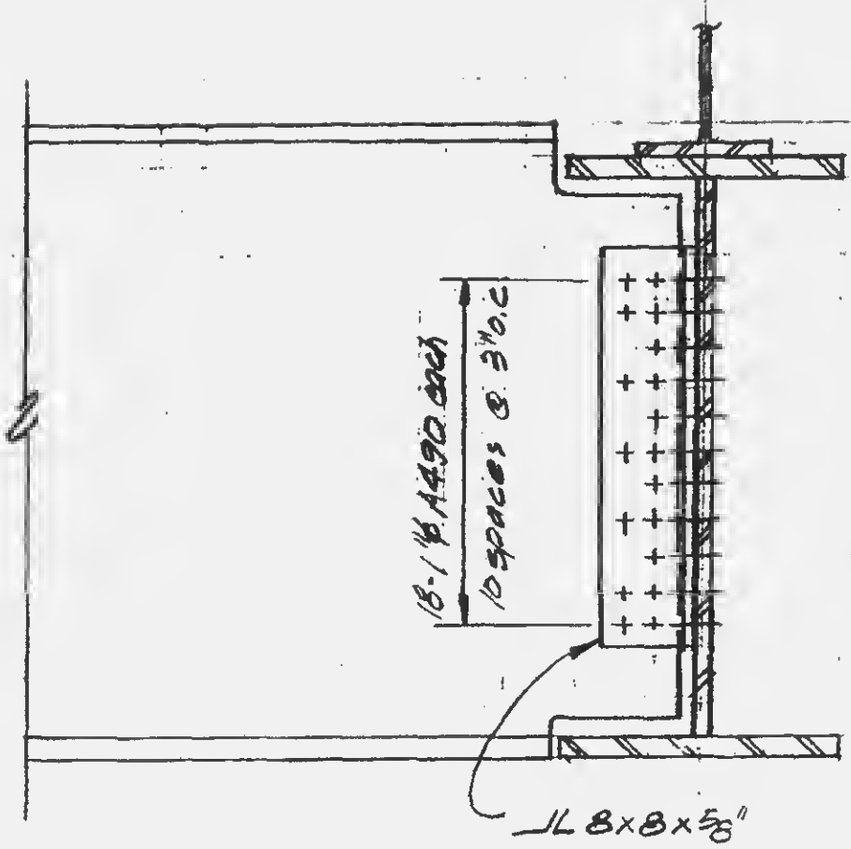
REVIEWED

12-JK2-180.2

REVISIONS



Detail 180 G
Detail 180 J



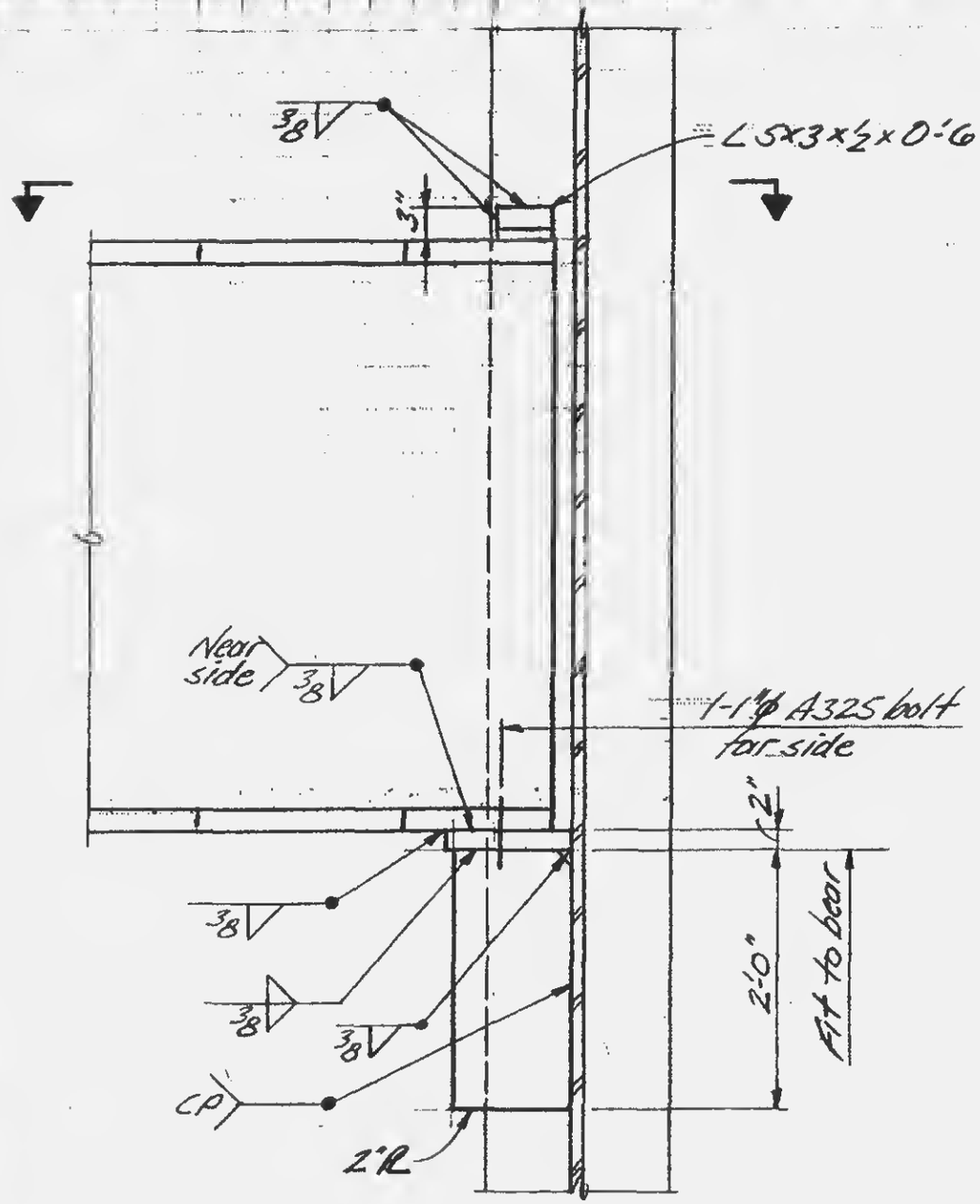
Detail 180 H

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

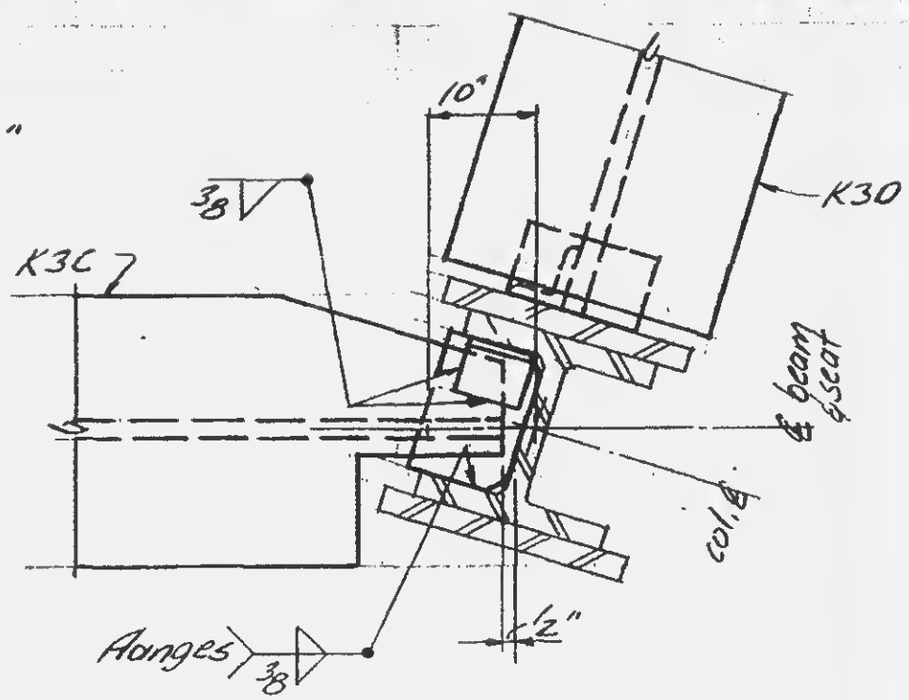
DESIGNED H. Koer
DRAWN
REVIEWED

12-JK2-1803

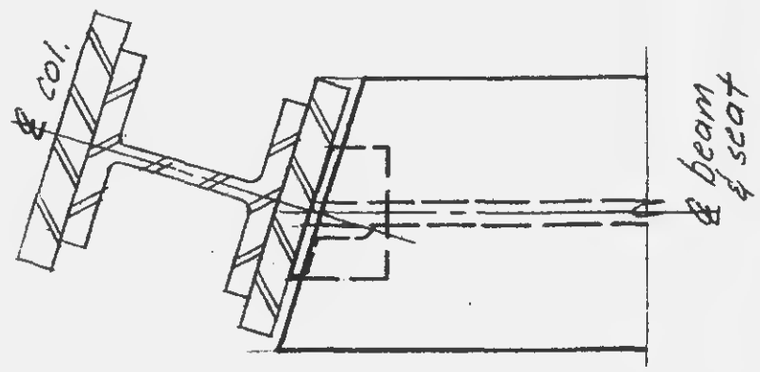
REVISIONS



180K



180 K & N



180M

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No 34360
UNIVERSITY OF THE STATE OF NEW YORK

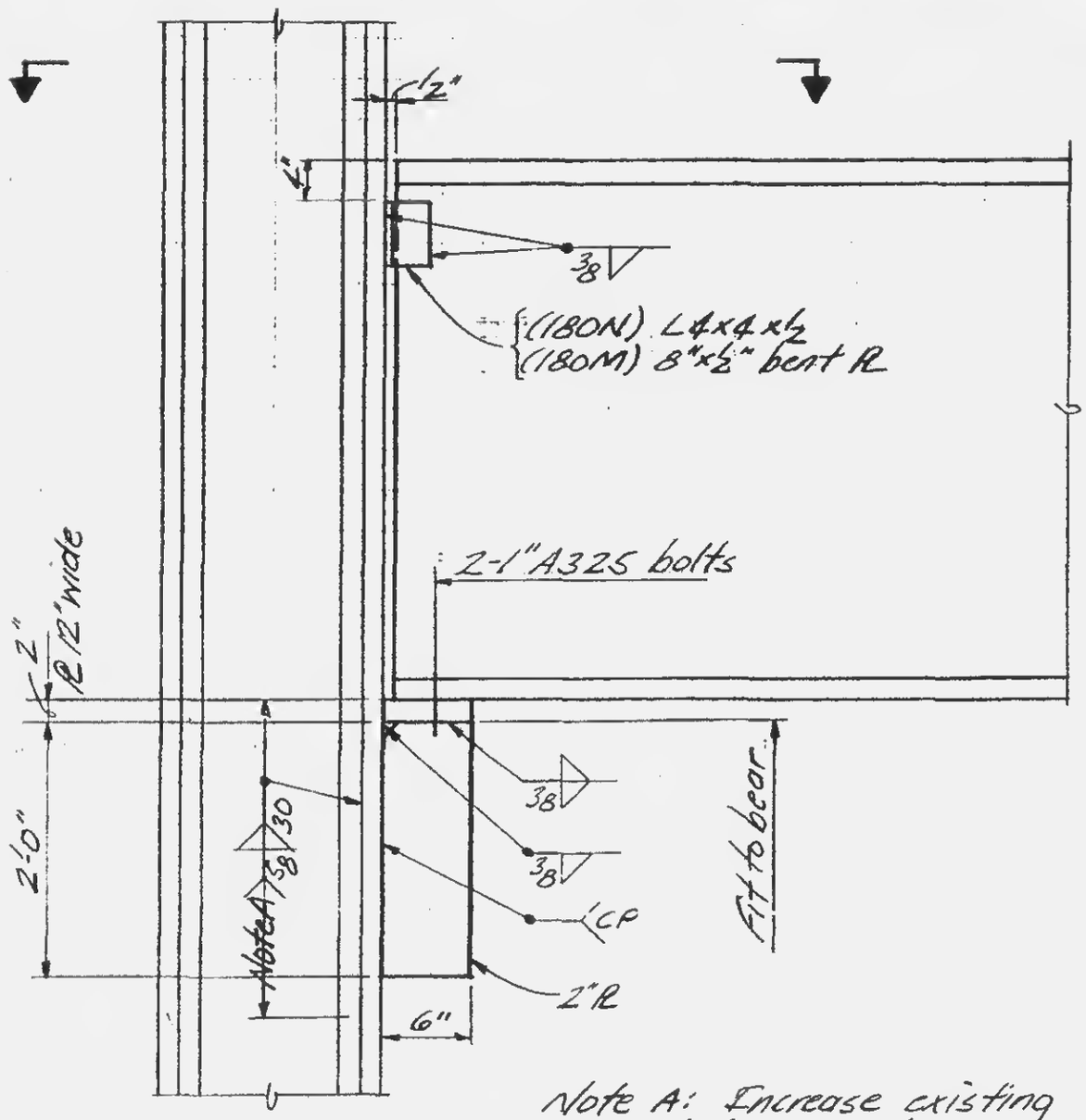
DESIGNED J. Rost
DRAWN J. Adams
REVIEWED

12-JK2-180.4

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — STRUCTURAL CIVIL ENGINEERS

PROJECT THE WORLD TRADE CENTER | TITLE GIRDER DETAILS - EL 320 | DATE 9-15-71

REVISIONS



Note A: Increase existing weld to size shown.

180M
180N

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

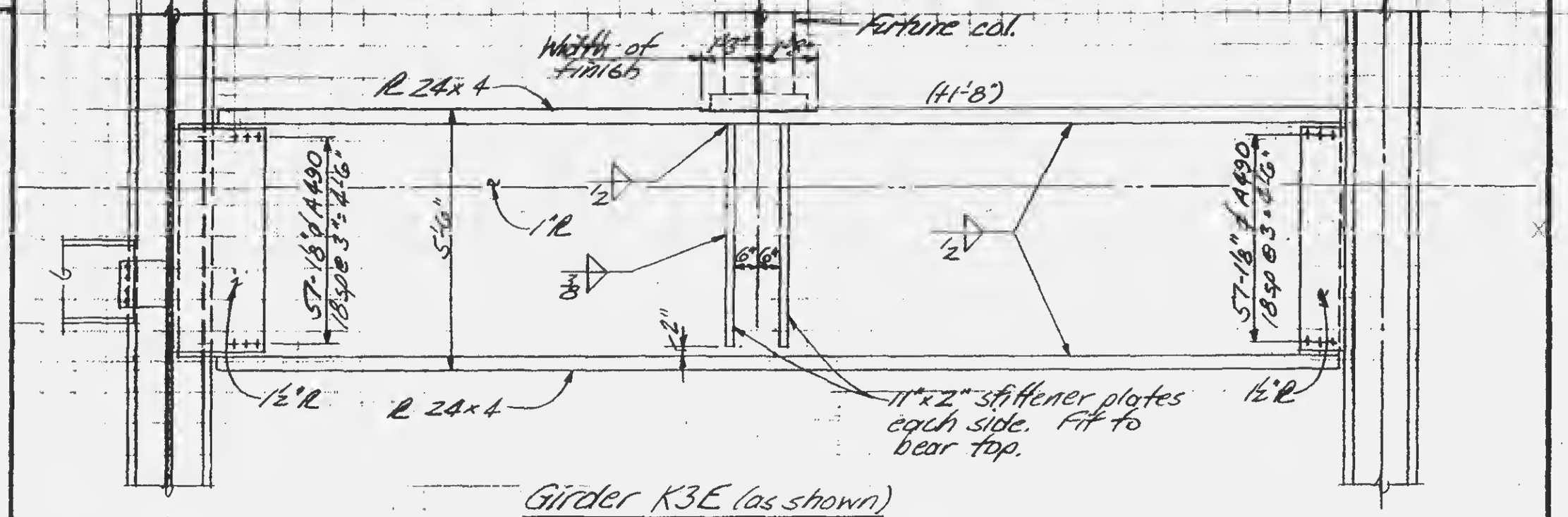
DESIGNED
DRAWN
REVIEWED

12-JKZ-180.5

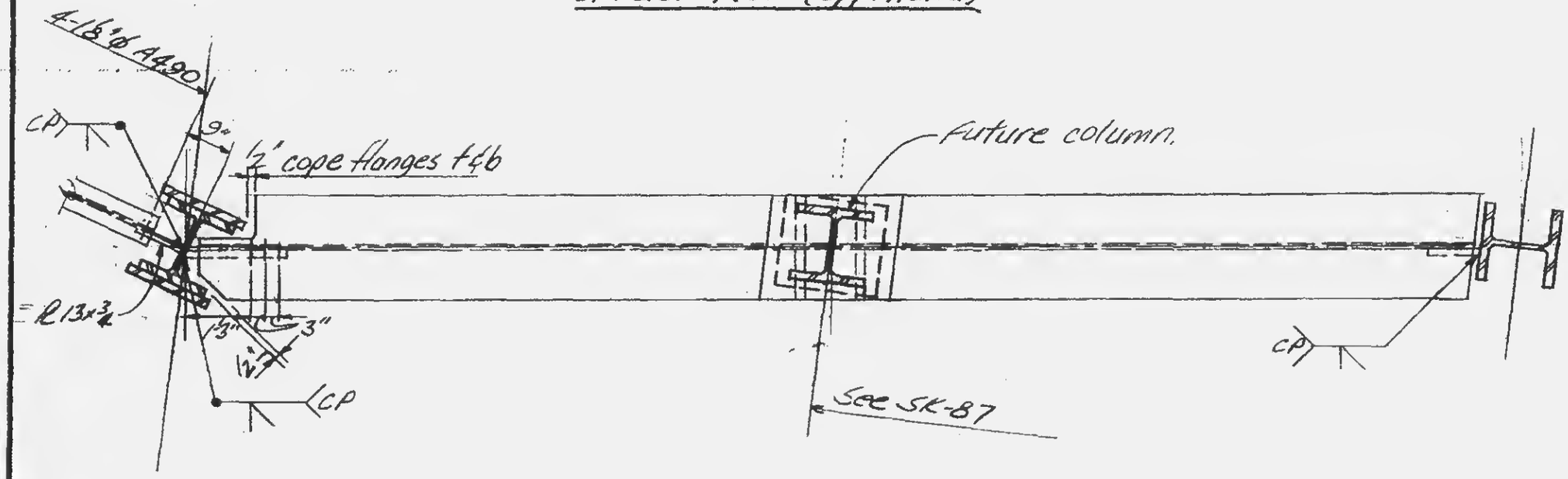
KLING CHRISTIANSEN ROBERTSON

THE NEW GROUP K3E (K3F) OF 294

REVISIONS



Girder K3E (as shown)
Girder K3F (opp. hand)



Plan

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN

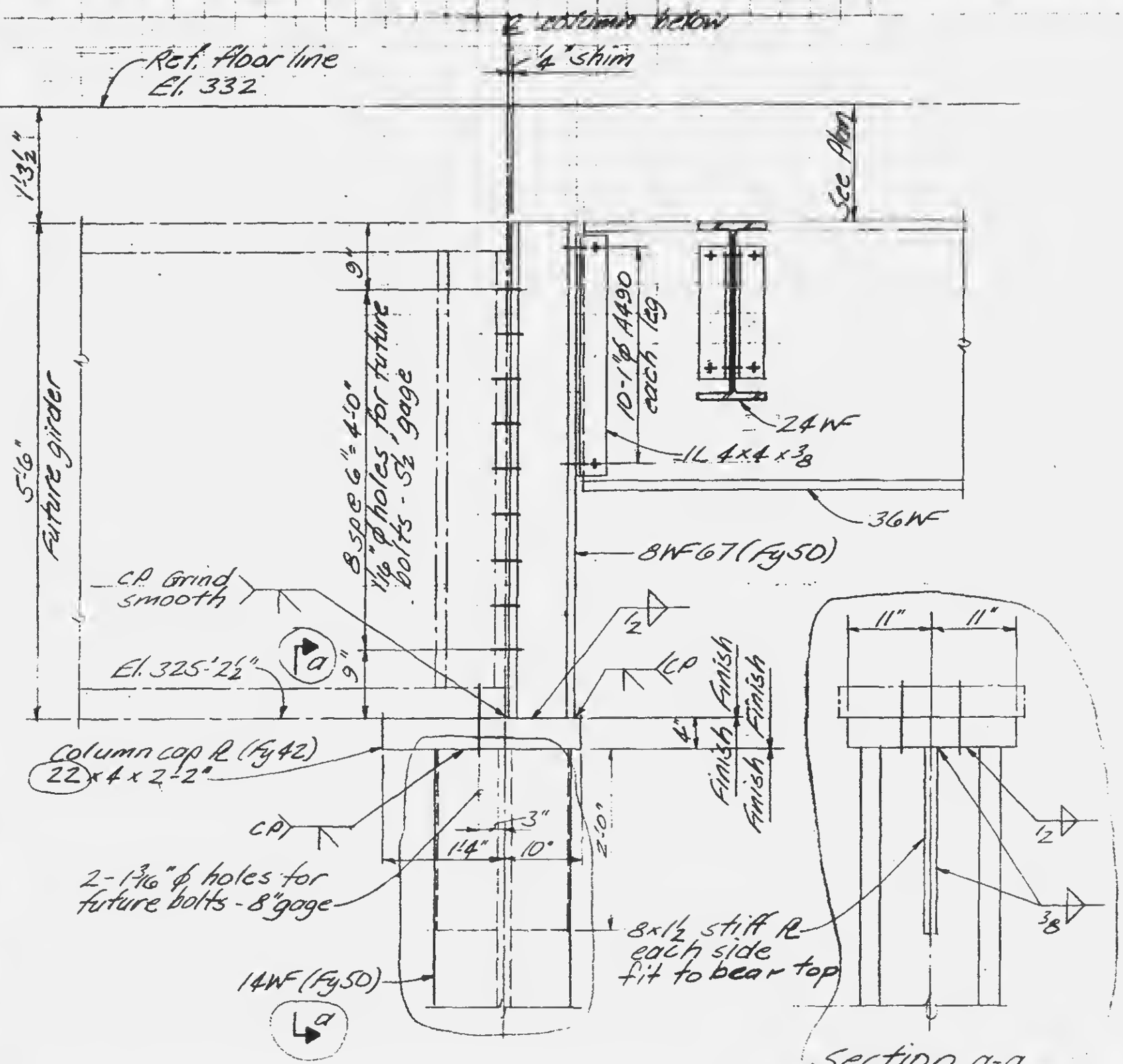
REVIEWED
W Brewer

12-JK2-180.6

SKILLING HELLE CHRISTIANSEN ROBERTSON — Structural Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: CAISSON DETAILS - EL 332 | PART: 1-15-72

REVISIONS
3/25/72



LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN
J Adams

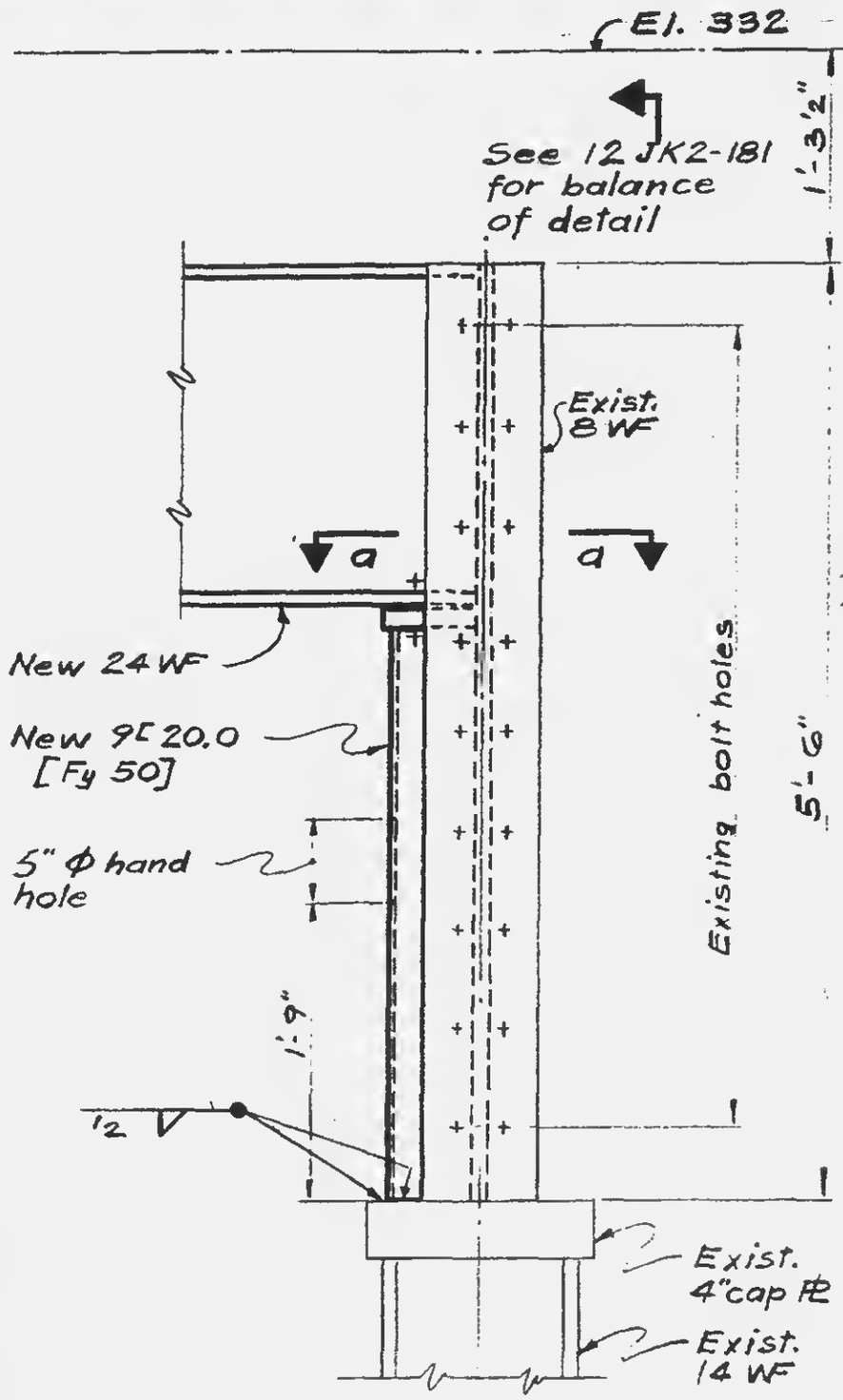
REVIEWED
W Brewer

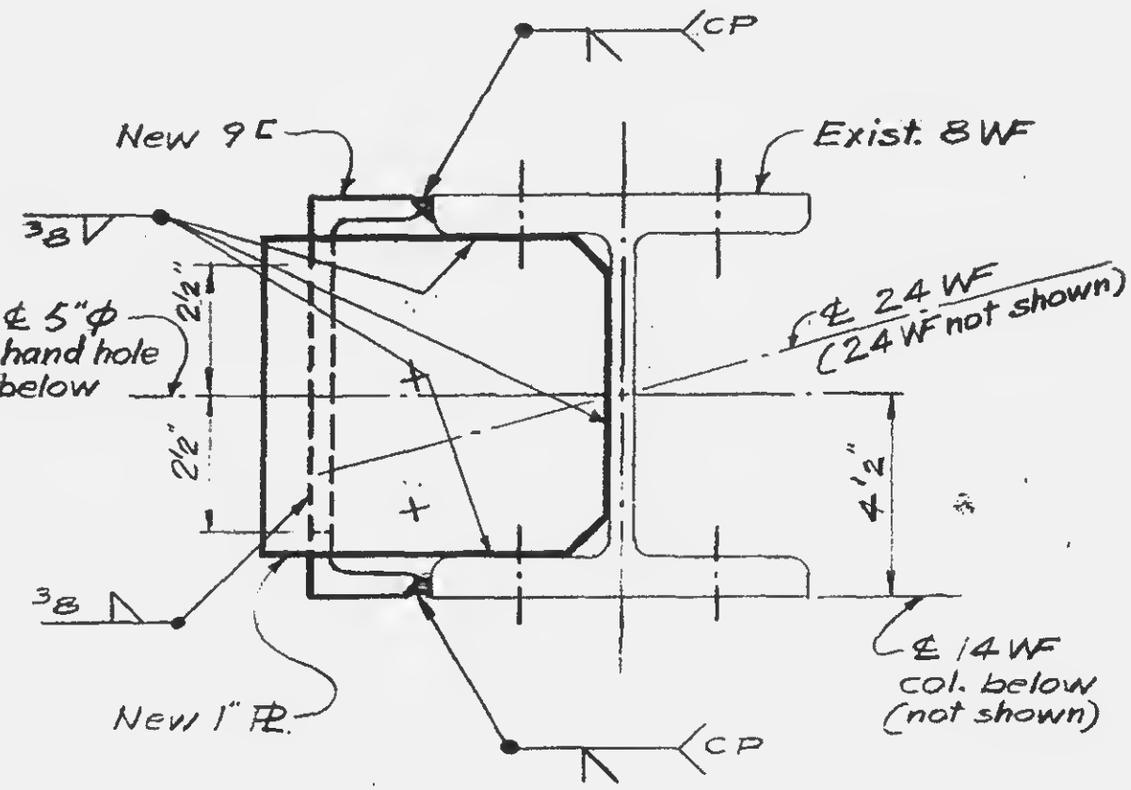
12-JKZ-181

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAILS - EL 332 | DATE: 4-7-72

REVISIONS





Section a-a

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN H.A.W.

REVIEWED

12-JK2-182

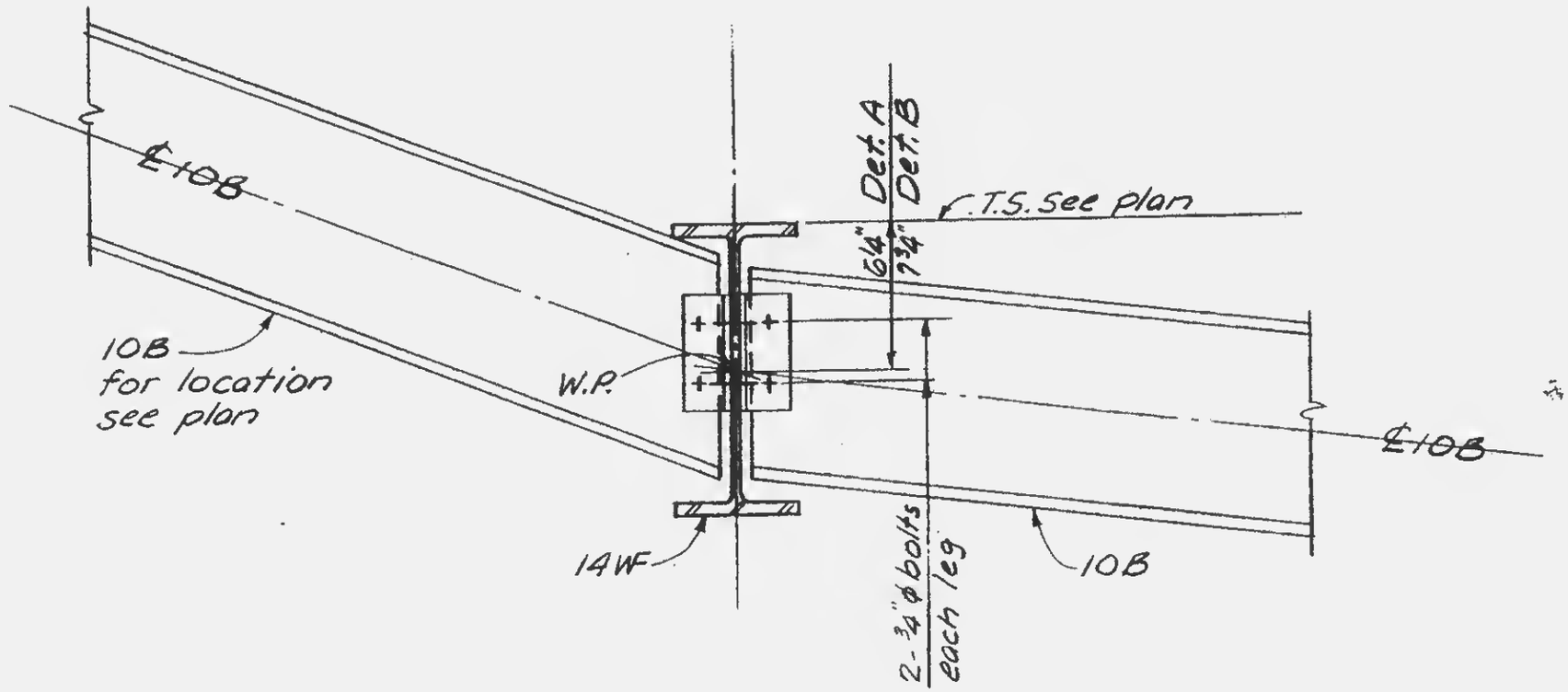
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER

TITLE: BEAM CONNECTION DETAIL

DATE: 4-7-72

REVISIONS



LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN
A. Franqui

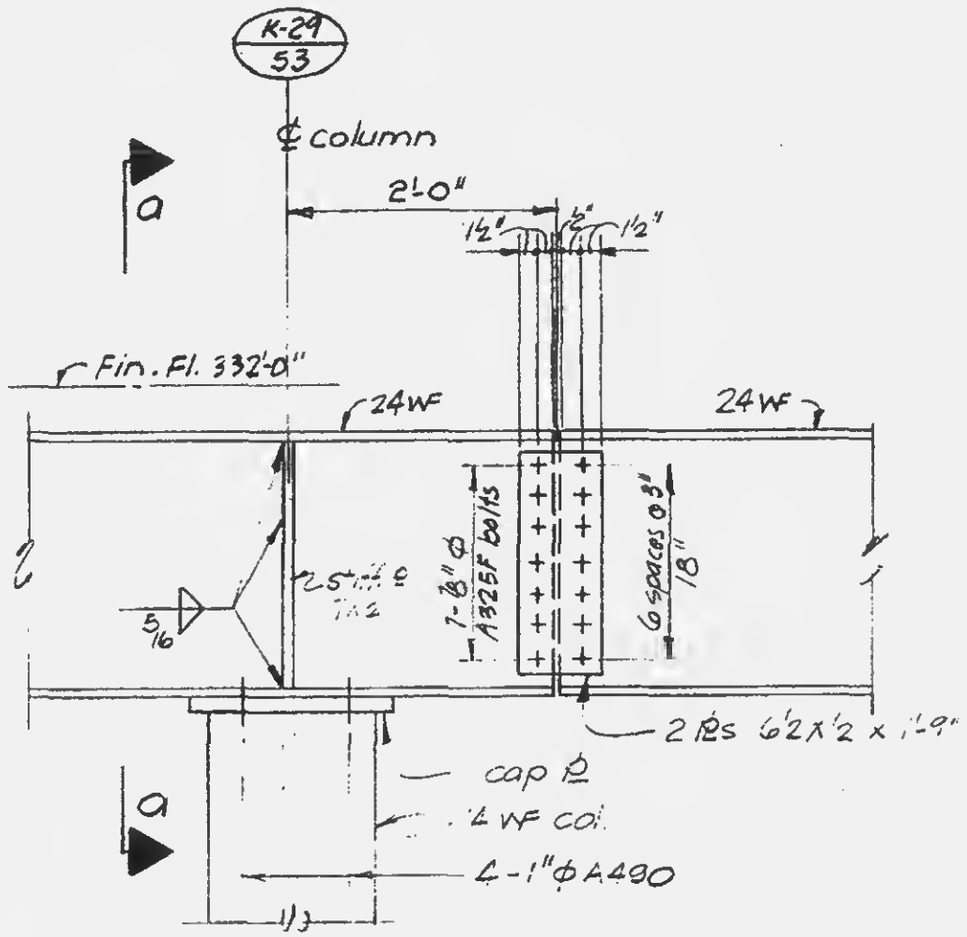
REVIEWED

12-JK2-183

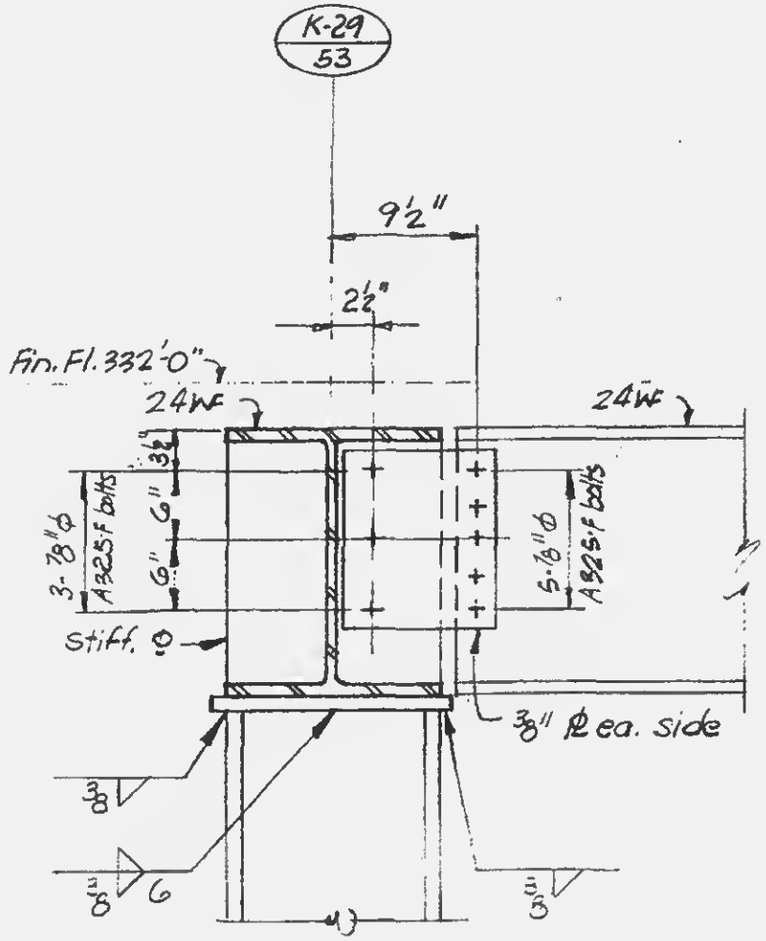
SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: CONNECTION DETAIL - EL. 332 | DATE: 6-9-72

REVISIONS



Detail A



Section a-a

LICENSED PROFESSIONAL ENGINEER
LESLIE E. ROBERTSON
No. 34360
UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED MR

DRAWN

REVIEWED

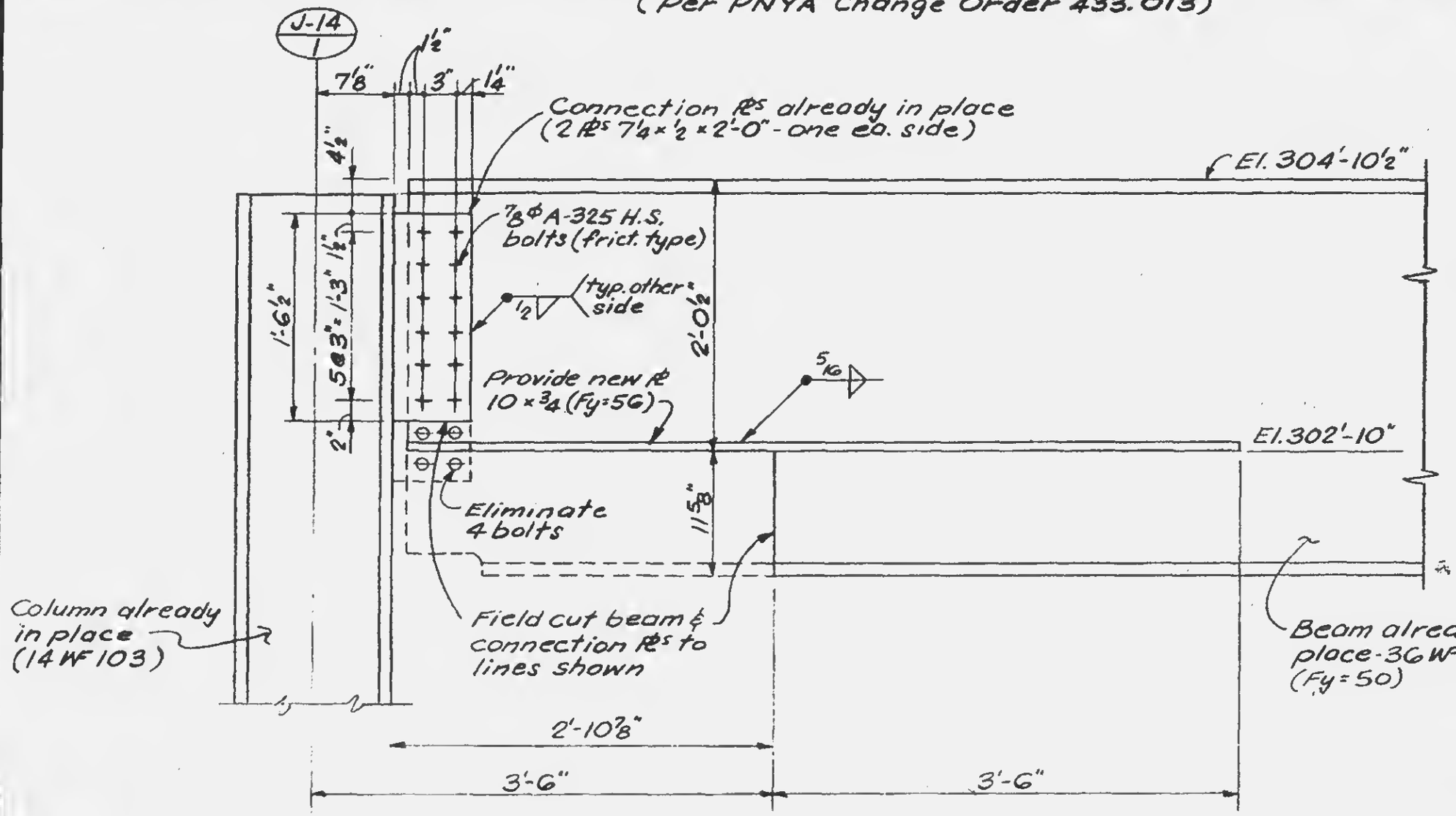
12-JK2-184

SKILLING, HELLE, CHRISTIANSEN, ROBERTSON — Structural & Civil Engineers

PROJECT: THE WORLD TRADE CENTER | TITLE: DETAIL FOR "NOTCHING" BEAM ALREADY IN PLACE | DATE: 1-23-69

(Per PNYA Change Order 433.013)

REVISIONS



Location of beam — Zone J-3 (street level) East of column J14-1 as shown on Dwg. SJ-93

Notes:

1. All field work to be carried out under contract WTC-230.00 and to be completed before any concreting work in this area.
2. All welds to be E70xx.

LICENSED PROFESSIONAL ENGINEER — LESLIE E. ROBERTSON — No. 34360 — UNIVERSITY OF THE STATE OF NEW YORK

DESIGNED

DRAWN S.C.

REVIEWED E.L.

12-JK2-199